AD/A-002 063

VIBRATION AND TEMPERATURE SURVEY PRODUCTION AH-1G HELICOPTER

Emmett J. Laing, et al

Army Aviation Systems Test Activity
Edwards Air Force Base, California

March 1974

DISCLAIMER NOTICE

The findings of this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

DISPOSITION INSTRUCTIONS

Destroy this report when it is no longer needed. Do not return it to the originator.

TRADE NAMES

The use of trade names in this report does not constitute an official endorsement or approval of the use of the commercial hardware and software.

AD/A002 063

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER USAASTA PROJECT NO. 70-15-5	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) VIBRATION AND TEMPERATURE SURVEY PRODUCTION AH-1G HELICOPTER		5. TYPE OF REPORT & PERIOD COVERED FINAL REPORT 12 September-29 November 1973 6. PERFORMING ORG. REPORT NUMBER USAASTA PROJECT NO. 70-15-5
7. AUTHOR(s) EMMETT J. LAING ARNOLD E. WEAND JR, CPT, TC, US ARMY		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS *US ARMY AVIATION SYSTEMS TEST ACTIVITY EDWARDS AIR FORCE BASE, CALIFORNIA 93523		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 738017.A50 Q40191 GH 3GH EJ3H004100EJEJ
11. CONTROLLING OFFICE NAME AND ADDRESS *US ARMY AVIATION SYSTEMS TEST ACTIVITY EDWARDS AIR FORCE BASE, CALIFORNIA 93523		12. REPORT DATE MARCH 1974 13. NUMBER OF PAGES ~~370~~ 368
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE NA

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

*Redesignated US Army Aviation Engineering Flight Activity (same address)

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Vibration and temperature measurement tests
AH-1G helicopter
Helicopter components failure rates
Vibration and temperature environment
Crew performance
Flight conditions
Tail rotor drive shaft gear vibration levels
Cabin temperatures

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Vibration and temperature measurement tests were conducted on [illegible]uction model AH-1G helicopter to define the vibration and temperature e[illegible]nt for the instruments, avionics, crew stations, and selected compo[illegible]rts for representative flight conditions. Testing was performed by the Unite[illegible]s Army Aviation Systems Test Activity at Edwards Air Force Base, Calif[illegible] between 12 September and 29 November 1973. The testing consisted of 29 f[illegible]s totaling

(continued)

20. Abstract

25 productive test hours. Vibration data were recorded from 61 accelerometer locations for 57 flight conditions and narrow band spectral analyses were performed on the vibration data. The results of the spectral analyses were summarized by use of statistical methods. Instrument and avionics nonfiring vibrations were primarily low-frequency and were caused by the main rotor. Vibration levels increased during weapons firing; however, the AH-1G instrument and avionics vibration level for all test conditions was among the lowest of all helicopters tested. The highest vibration levels were recorded at the tail rotor drive shaft gearboxes. The highest cabin temperatures were recorded under static conditions and decreased in forward flight. There were two shortcomings: amplification of vibrations at AH-1G driving frequencies by the vibration isolation mounts on the ARC-134 and ARN-83 radios; and vibration levels during nonfiring flight at the crew stations in excess of the limits of military specification MIL-H-8501A.

PREFACE

The United States Army Air Mobility Research and Development Laboratory, Eustis Directorate, Fort Eustis, Virginia, provided data reduction technical support through a contract with Northrop Corporation, Electronics Division, Palos Verdes Peninsula, California. The United States Army Air Mobility Research and Development Laboratory also provided instrumentation installation, calibration, and maintenance support. The dental work required to construct the pilot's bite block was provided by the Air Force Flight Test Center Dental Laboratory, Edwards Air Force Base, California. Wet Bulb Globe Temperature measurement equipment was obtained from the United States Army Medical Equipment Research and Development Laboratory, Fort Totten, New York. Technical advice on the measurement of pilot vibrations was obtained from the United States Army Aeromedical Research Laboratory, Fort Rucker, Alabama.

TABLE OF CONTENTS

Preceding page blank

Page

APPENDIXES

INTRODUCTION

BACKGROUND

1. The failure rates of helicopter components such as instruments, avionics, gearboxes, bearings, and pumps have hindered mission accomplishment and have increased the logistic support effort required to keep Army helicopters at the necessary level of operational capability. It is suspected that many component failures result from an excessive vibration and temperature environment and that the helicopter vibration and temperature environment may degrade crew performance. However, there are insufficient data available to verify these suspicions. To obtain the data necessary to define the vibration and temperature environment of helicopter components and the crew stations, the United States Army Aviation Systems Test Activity (USAASTA) was directed (ref 1, app A) by the United States Army Aviation Systems Command (AVSCOM) to conduct a vibration and temperature survey on present-day Army helicopters.

2. This report on the AH-1G helicopter is the fifth of a planned series of six reports which will define the vibration and temperature environment of the OH-58A (ref 2, app A), UH-1H (ref 3), CH-54B (ref 4), OH-6A (ref 5), AH-1G, and CH-47C helicopters.

TEST OBJECTIVE

3. The objective of the entire environmental test project is to determine quantitative vibration and temperature environment data for all present-day Army helicopters. The objective of the AH-1G environmental survey was to determine the vibration and temperature environment of the AH-1G instruments, avionics, selected components, and the crew stations under all normal operating conditions.

DESCRIPTION

4. The AH-1G helicopter is a gas turbine-powered armed helicopter with a maximum gross weight of 9500 pounds. It is configured with two-bladed, teetering main and tail rotors. Tandem seating is provided for the pilot in the aft seat and copilot/gunner in the front seat. The cyclic, collective, and pedal controls are hydraulically boosted and irreversible, and a three-axis rate-sensing stability and control augmentation system is provided. Landing gear is of the fixed energy-absorbing skid type. A single Lycoming T53-L-13 free gas turbine engine rated at 1400 shaft horsepower (shp) at sea-level, standard-day, uninstalled conditions powers the aircraft. The engine is derated to 1100 shp due to the maximum torque limit of the main transmission. Standard armament is the XM23E1 armament subsystem with the M134 machine gun and XM129 grenade launcher mounted in the weapons turret. One of each or both of the same weapon may

be mounted in the turret. The M134 machine gun fires 7.62mm ammunition at rates of fire of 2000 and 4000 rounds per minute. The XM129 grenade launcher fires 40mm grenades at 400 rounds per minute. Two store mounting points are located on each side of the helicopter on stub wings. Additional armament may be mounted on the stub wings. For this testing 2.75-inch folding fin aerial rockets (FFAR) were fired from two M159C rocket pods (19 rockets per pod maximum) mounted on the inboard store mounting points. In addition, the XM35 armament subsystem was installed on the left stub wing. This subsystem consists of the XM195 20mm gun with a rate of fire of 750 rounds per minute, two streamlined right- and left-hand ammunition boxes mounted adjacent to the fuselage under the stub wings, and associated hardware. Both the pilot and gunner instrument panels are mounted on vibration isolators on aircraft which have been modified to accept the XM35 armament subsystem. Selected avionics items are mounted on vibration isolators. The avionics equipment on the test aircraft (serial number 67-15844) was as specified in the operator's manual (ref 6, app A). Detailed aircraft flight instruments and avionics information may be found in appendix B and in the operator's manual.

TEST SCOPE

5. Vibration data were recorded during steady flight, maneuvering flight, and weapons-firing flight from 53 triaxial accelerometer locations, 4 biaxial accelerometer locations, and 4 uniaxial locations for 57 flight conditions. Five configurations were tested: light, 7560 pounds; heavy, 8680 pounds; armed firing turret, 7807 pounds; armed firing rockets, 8116 pounds; and armed firing XM195 (20mm), 8470 pounds. The flight conditions tested are listed in table 1 and the various configurations are presented in appendix B. Temperature data were recorded at 18 locations in flight and during static hot soaks in the sun. The nose of the helicopter was pointed toward the sun for all temperature measurements. The accelerometer and thermocouple locations are described in appendix C and photographs of these locations are presented in appendix C. A total of 29 flights, consisting of 25 productive testing hours, were conducted at Edwards Air Force Base, California. Comparisons with vibration data previously gathered on other helicopters were made. The flight restrictions and operating limitations observed during this evaluation were as specified in the operator's manual (ref 6, app A). The flight conditions and configurations used for all the AH-1G and previous helicopter environmental testing are contained in the test plan (ref 7).

TEST METHODOLOGY

6. The test AH-1G helicopter was instrumented to record vibration data on a frequency multiplexed-frequency modulated (FM-FM) magnetic tape system. One hundred seventy-one channels of acceleration vibration data were recorded from accelerometers mounted on the instrument panel, avionics, crew stations, and other selected components. The instrumentation was limited to recording data from 12 accelerometers simultaneously with 8 manual switching groups. This switching

Table 1. AH-1G Vibration Test Conditions.[1]

Test	Conditions[2]	Average Gross Weight (lb)	Configuration	Average Density Altitude (ft)	Average Temperature (~°C)
Hover	In ground effect, out of ground effect	7560 and 8680	Light and heavy	3300	16
Left sideward flight	In ground effect, 15 knots				
Level flight	V_H (149 KCAS), $0.9V_H$, $0.8V_H$, $0.7V_H$, V_{loiter} (60 KCAS); clean, 7560 lb GW			5400	16
	V_H (135 KCAS), $0.9V_H$, $0.8V_H$, $0.7V_H$, V_{loiter} (60 KCAS); XM159C rocket pods, 8680 lb GW				
Climb	$V_{best\ R/C}$ (62 KCAS), 7560 lb GW; $V_{best\ R/C}$ (67 KCAS), 8680 lb GW; maximum power			5500	21
Descent	$V_{min\ R/D}$ (62 KCAS), 7560 lb GW; $V_{min\ R/D}$ (67 KCAS), 8680 lb GW; minimum power			5500	21
	$V_{cruise\ R/D}$ (96 KCAS), 500 ft/min				
Takeoff	Normal (A), level acceleration (B); from 3-ft hover			3300	16
Landing	Steep (A), shallow (B); to 3-ft hover			3300	16
Maneuvering flight	90° turns at constant altitude; 30° and 60° bank angle, right and left; 140 KCAS entry airspeed, 7560 lb GW; 130 KCAS entry airspeed, 8680 lb GW			5300	17
	Simulated gun runs. Enter at 3000 ft AGL, 84 KCAS, 28 psi torque, 15° dive angle. Pull out at 1500 ft AGL, 180 KCAS, 2g. Dive pullouts were to right and left				
	V_{NE}, 41 psi torque, dive angle for 180 KCAS, 7560 lb GW; 160 KCAS, 8680 lb GW				
Ground run	Flight-idle (324 rpm), ground-idle (220 rpm), wind speed 15 to 20 knots			3300	16
Weapons firing	2000 and 4000 rd/min, gun horizontal. 90° right, left, and forward gun positions	7810	M134 7.62mm machine gun	3560	13.4
	400 rd/min, gun horizontal. 90° right, left, and forward gun positions	7800	M129 40mm grenade launcher		
	750 rd/min	8470	XM195 20mm machine gun		
	2.75-inch FFAR, fired in groups of 14	8120	XM159C rocket pods		

[1]Coordinated flight maintained at level flight, climb, descent, and maneuvering flight test conditions.
[2]All abbreviations used are defined in appendix F.

enabled a total of 96 channels of vibration data to be recorded for each flight condition. To record the total of 171 channels, the accelerometers were relocated and all flight conditions were repeated. Eighteen channels of temperature data were hand-recorded from a single display by manually switching to the desired pickup. The parameters required to define the flight condition were hand-recorded from calibrated ship's standard instruments.

7. A total of 9591 vibration data records were recorded and narrow-band spectral analyses were performed on 8898 of these data records. To present the results of the spectral analysis in a form which could be more easily comprehended than the 8898 spectral analysis plots, a statistical method of summarizing the data on a digital computer (referred to as data compression) was developed. The data were compressed by selecting groups of the 8898 spectral analysis plots and summarizing each of these groups in two compressed data plots. These two compressed data plots show the maximum acceleration and the mean plus 3-standard-deviation (3-sigma) acceleration with the mean acceleration in the form of a frequency spectrum similar to the individual spectral analysis plots. The mean plus 3-sigma acceleration value is that acceleration below which 99.87 percent of all data recorded fell. Data compression was accomplished by taking the acceleration value of each of the 500 frequencies which were output by the spectral analyzer for all spectral analysis plots in a compression group and finding the maximum and minimum acceleration, the mean acceleration, and the mean plus 3-sigma acceleration. A table is provided with the maximum acceleration compression plots which lists the flight condition, accelerometer location, and axis at which each maximum acceleration occurred. The equations used to calculate the mean and standard deviation and a block diagram of the spectral analysis and data compression systems are presented in appendix D.

8. The flight conditions selected for the vibration testing were selected to cover all normal flight conditions encountered in operational use of the AH-1G helicopter. The first pass of the data compression grouped the data according to flight condition. The second and third data compression passes combined all of the flight conditions in proportion to the number of columns each flight condition occupies in the data array (figs. 1 through 3, app E). For example, landings comprise 4 out of 46 nonfiring columns or 8.7 percent of the data which, in the compressions that combine flight conditions, represents a flight during which 8.7 percent of the flight time is spent in landings. The first-pass data compressions may be used to combine flight conditions in any proportion desired.

RESULTS AND DISCUSSION

GENERAL

9. The AH-1G nonfiring instrument and avionics vibrations were primarily sinusoidal, with a random variation of amplitude with time at each discrete frequency. The primary source of low-frequency vibration was the main rotor, with a maximum mean plus 3-sigma acceleration of 0.55g at the main rotor 2-per-rotor-revolution (2/rev) frequency of 10.8 hertz (Hz). Although the maximum vibration recorded occurred at the main rotor 2/rev frequency, the largest vibration levels for most of the instruments and avionics occurred at the main rotor 8/rev frequency of 43.2 Hz. Weapons-firing vibrations induced by the M134 (7.62mm) and XM195 (20mm) gun firing were primarily harmonic. No harmonic content was apparent when firing the XM129 (40mm) grenade launcher or 2.75-inch rockets. The weapons-firing vibration levels were higher in amplitude and frequency than the nonfiring vibration levels, with a maximum mean plus 3-sigma vibration of 1.3g at 355 Hz. The highest instrument and avionics vibration recorded during weapons firing was 7.0g at 420 Hz at the gunner instrument panel mount. The amplitude limits of military specification MIL-STD-810B (ref 8, app A) were not exceeded for any test conditions, but the upper frequency limits of MIL-STD-810B were exceeded for most of the weapons firing. The instrument and avionics vibration isolation mounts attenuated most weapons firing-induced vibrations; however, the isolation mounts on the ARC-134 and ARN-83 radios amplified AH-1G main rotor-induced vibrations. The pilot seat pad attenuated the primary seat structure vibrations and the pilot's body attenuated vibrations above 22 Hz. Specification limits for pilot station vibrations during maneuvering flight and weapons firing are required. The maximum mean plus 3-sigma vibration level recorded was 38g at 1915 Hz at the tail rotor drive shaft gearboxes. The frequency content of the AH-1G main rotor-induced vibrations was similar to that of the UH-1H and OH-58A helicopters, but showed a higher harmonic content than the main rotor-induced vibrations of the CH-54B and OH-6A helicopters. The AH-1G instrument and avionics vibration environment for both firing and nonfiring test conditions was among the lowest of all helicopters tested. The highest instrument and avionics temperatures were recorded in the cabin area under static conditions and decreased in forward flight. The highest component temperature rise was 61.2°C above the outside air temperature at the tail rotor drive shaft No. 3 hanger bearing. The results of this test project indicate the following: Data in this and previous environmental test reports should be applied to revising the appropriate military environmental specifications; the upper frequency limit of 500 Hz of MIL-STD-810B should be extended; improved vibration isolation for instruments and avionics should be provided; and the pilot station vibration limits of military specification MIL-H-8501A (ref 9, app A) should be extended to include maneuvering and weapons-firing flight conditions.

VIBRATION DATA

Helicopter Vibration Sources

10. There are three primary sources of vibration in present-day gas turbine-powered helicopters: the main and tail rotors; all other rotating components; and, if the helicopter is armed, gunfire. The rotor-induced vibrations are of a low frequency, with the fundamental frequency equal to the rotor speed. In present-day helicopters, the main rotor speed ranges from about 3 to 8 Hz with the rotor speed generally decreasing with increasing rotor diameter. A vibration occurring at the main rotor fundamental frequency is referred to as the one-per-rotor-revolution (1/rev). The rotor also induces harmonic vibrations at frequencies which are integral multiples of the number of rotor blades multiplied by the fundamental rotational frequency. Thus, a two-bladed rotor with a fundamental frequency of 5 Hz induces vibrations at frequencies of 5 Hz (1/rev), 10 Hz (2/rev), 20 Hz (4/rev), 30 Hz (6/rev), etc., and a three-bladed rotor at frequencies of 5 Hz (1/rev), 15 Hz (3/rev), 30 Hz (6/rev), 45 Hz (9/rev), etc. Normally, main rotor induced-vibrations beyond the 10th harmonic, 100 Hz for a two-bladed rotor, are not significant. Rotor-induced vibrations at harmonics of the rotor fundamental frequency are the predominant helicopter low-frequency vibrations and are caused by dissymetry of lift over the rotor disc which excites rotor blade structural modes and generally increases with airspeed. Vibrations are induced by all other rotating components in the helicopter. The frequencies range from the fundamental rotational frequency of the component up to geartooth, ball-bearing, and turbine-blade-passage frequencies which may range as high as 20 to 30 kilohertz. Gunfire-induced vibrations are caused by recoil forces transmitted through the gun mount and by muzzle blast pressures. They have a fundamental frequency equal to the gun rate of fire and harmonics of this fundamental up to about the 20th harmonic. Typically, the highest vibration level will be at one of the gunfire harmonic frequencies. Fundamental gunfire frequencies range up to about 70 Hz.

Data Relevancy

11. Qualitative pilot evaluation indicates that there is a wide variation in the vibration level of different helicopters of the same model due to differences in the mechanical condition of each helicopter. Thus, if vibration levels are to be measured which are representative of those encountered in a particular model of helicopter, then a sample of several units of this model of helicopter must be tested. All of the data in this report are from one AH-1G helicopter, serial number 67-15844, which began the test program with 1544 flight hours.

Data Presentation

12. The data were summarized in three data compression passes and in 24 transmissibility compressions. Each data compression is presented as two plots: maximum acceleration recorded versus frequency, and mean with mean plus 3-sigma acceleration versus frequency. The mean plus 3-sigma acceleration values best represent the test data, since accelerations in excess of the mean plus 3-sigma

limit were recorded less than 0.13 percent and would be only rarely encountered in operational use of the helicopter. The data grouping used in each compression pass is summarized in table 2, with details of the data compression shown in the data arrays (figs. 1 through 3, app E). In the data array, each square represents a spectral analysis data point. The numbers assigned to each group of squares in the data array represent a compression group, with squares having like numbers belonging to the same compression group. This compression group number is written on each compressed data plot for identification. The transmissibility compressions combine all axes and flight conditions for the input and output accelerometer locations of interest. The specific locations compressed are indicated on each transmissibility plot.

13. The instrument and avionics nonfiring and firing third-pass compression results are presented in tables 3 and 4 and in figures A through D in the body of this report. The second-pass nonfiring and firing compressions are presented in appendix E for all accelerometer locations. Only the instruments, avionics, and pilot station compressions are presented in appendix E for the first-pass nonfiring and firing conditions. The first-pass compressions for the other locations are available from USAASTA. For the second and third compression passes, a table is presented with the plot of the maximum accelerations which lists the accelerometer location, axis, and flight condition at which each significant peak acceleration occurred. The acceleration values which are presented in this report are one-half of the peak-to-peak value. The individual spectral analysis data, on digital magnetic tape, are available from USAASTA.

Instrument and Avionics Vibration

14. Instrument and avionics vibration data were gathered from 20 triaxial accelerometer locations at the test conditions shown in table 1. Accelerometer locations and photographs are provided in appendix C. Third-pass data compressions which combine all instrument and avionics locations for all nonfiring and firing flight conditions are presented in figures A through D in the body of this report. Second-pass compressions are presented in figures 4 through 97, appendix E, and first-pass compressions are presented in figures 98 through 253.

15. The nonfiring vibration data were found to be primarily sinusoidal, with a random variation of acceleration amplitude with time at each discrete frequency. This random variation was usually less than 30 percent of the mean value and was apparently due to small changes in variables such as light turbulence or small control inputs. Table 5 lists the primary AH-1G vibration sources and their frequency at the main rotor test speed of 324 rpm. The main rotor was the primary nonfiring vibration source, with the tail rotor and engine shaft also causing significant vibrations. The maximum mean plus 3-sigma acceleration value of 0.55g at the main rotor 2/rev frequency of 10.8 Hz was recorded (fig. B). A peak acceleration value of 3.01g at the main rotor 2/rev frequency was recorded along

Table 2. Data Compression Grouping.

Compression Pass	Group[1]	Group Elements (location number)	Number of Group Elements	Number of Compressions
1st	Equipment	Pilot instrument panel (1, 3, 5, 7, 8) Pilot instrument panel structure (2, 4, 6) Gunner instrument panel (9, 11, 13) Gunner instrument panel structure (10, 12) Gun sight (14) Avionics (15, 16, 17, 18, 19, 20) Gunner seat structure (21) Pilot input (22, 23, 24, 25, 26) Pilot (27, 28) Lift link (29) Tach generators (30, 31, 32) Transmission mounts (33, 34, 35, 36) Transmission case (37) Engine mounts (38, 39, 40) Engine deck (41, 42) Engine (56, 57, 58) Hanger bearings (43, 44, 45) Tail rotor gearboxes (46, 47) Tail boom attach points (48, 49) Collective servo (50) Elevator tip (51) Navigation lights (52, 53) Gun mounts (54, 55) Fuselage skin (59, 60, 61)	24	[2]300
	Flight conditions[3]	Hover Left sideward flight Level flight Climb Descent Takeoff and landing Maneuvering Ground run Firing[4]	13	
2nd	Equipment	Same as 1st pass	24	[2]47
	Flight conditions	All firing and nonfiring	2	
3rd	Equipment	All instruments and avionics (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20)	1	2
	Flight conditions	All firing and nonfiring	2	

[1]All axes combined for all compressions.
[2]No nonfiring compressions calculated for fuselage skin locations.
Collective servo and elevator tip compressions not calculated for M134 weapons firing.
Tail boom attach points compression not calculated for 2.75-inch FFAR weapons firing.
[3]Flight conditions described in detail in table 1.
[4]M134, XM129, XM195, and 2.75-inch rockets.

Table 3. Instrument and Avionics Maximum Accelerations for Figure A. Nonweapons Firing.

Frequency (Hz)	Flight Condition	Configuration	Axis	Location Number	Amplitude (±g)	Source
10	V_{NE}[1]	Clean	Vertical	19	3.0	Main rotor 2/rev
21	Gun run, left	Clean	Vertical	19	1.47	Main rotor 4/rev
27	60° left bank	Heavy	Vertical	19	0.78	Tail rotor fundamental
32	V_{NE}	Clean	Vertical	19	1.61	Main rotor 6/rev
38	60° left bank	Heavy	Vertical	19	0.73	---
42	60° right bank	Heavy	Vertical	8	0.90	Main rotor 8/rev
74	V_{NE}	Heavy	Longitudinal	11	0.89	Tail rotor drive shaft
108	V_{NE}	Clean	Longitudinal	14	0.80	Engine shaft
16[illegible]	V_{NE}	Heavy	Vertical	20	2.52	Tail rotor 6/rev
324	V_{NE}	Heavy	Vertical	20	0.87	---

[1]Defined in appendix G.

Table 4. Instrument and Avionics Maximum Accelerations for Figure C. Weapons Firing.

Frequency (Hz)	Gun Configuration	Weapon	Axis	Location Number	Amplitude (±g)
264	---	XM195	Longitudinal	2	2.76
312	---	XM195	Longitudinal	10	4.54
360	90° Rt, 4000 rd/min[1]	M134	Vertical	10	5.46
420	90° Rt, 4000 rd/min	M134	Vertical	10	7.00
484	90° Rt, 4000 rd/min	M134	Vertical	12	3.80
584	---	XM195	Lateral	2	2.42
652	---	XM195	Vertical	10	3.46
812	---	XM195	Vertical	10	4.07
1004	---	2.75-inch FFAR	Longitudinal	18	2.05
1916	90° Rt, 4000 rd/min	M134	Longitudinal	20	2.31

[1]Defined in appendix G.

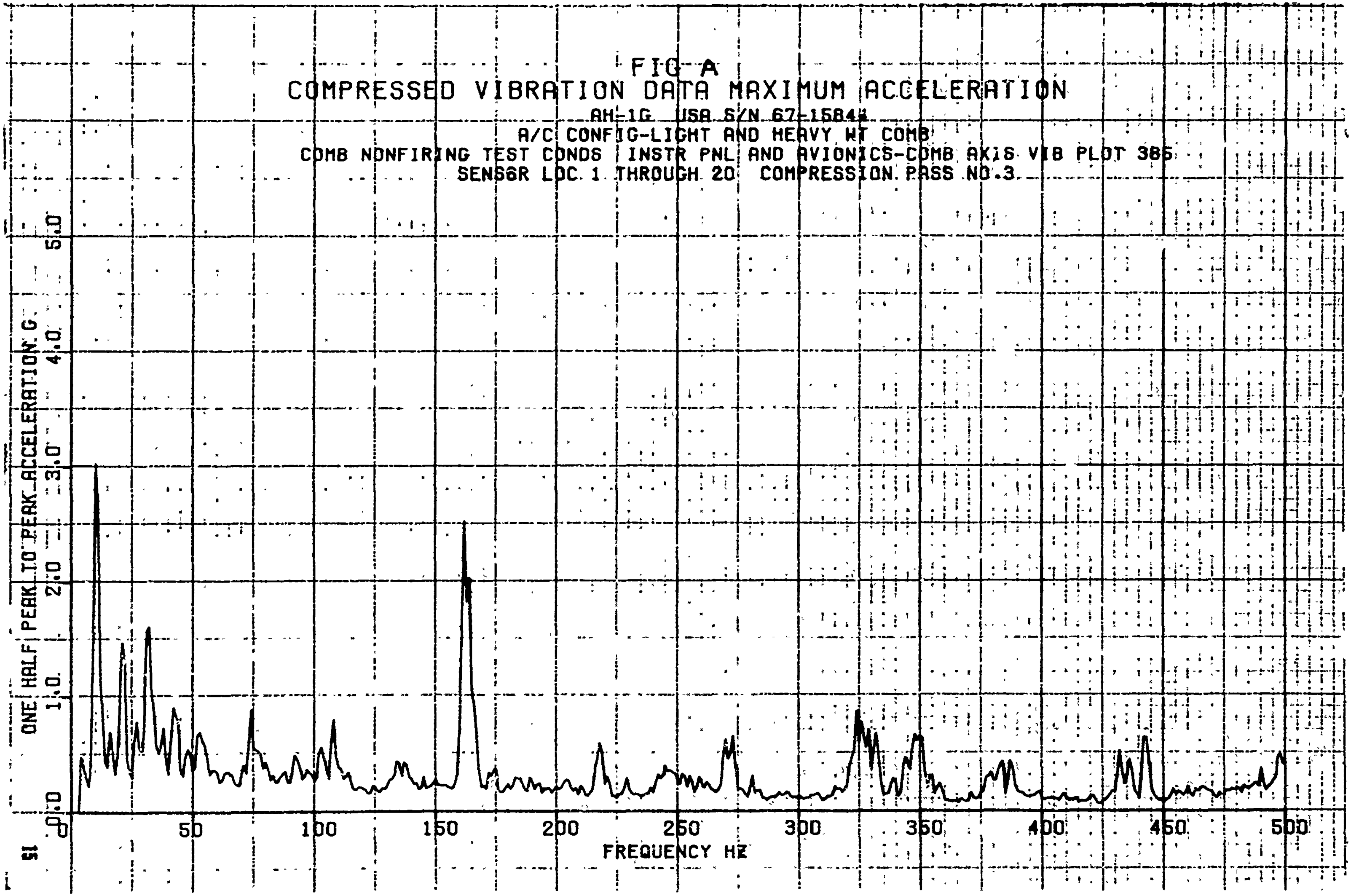


FIG A
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB NONFIRING TEST CONDS INSTR PNL AND AVIONICS-COMB AXIS VIB PLOT 385
SENSOR LOC 1 THROUGH 20 COMPRESSION PASS NO.3

FIG B

COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB NONFIRING TEST CONDS INSTR PNL AND AVIONICS-COMB AXIS VIB PLOT 365

SENSOR LOC 1 THROUGH 20 COMPRESSION PASS NO.3

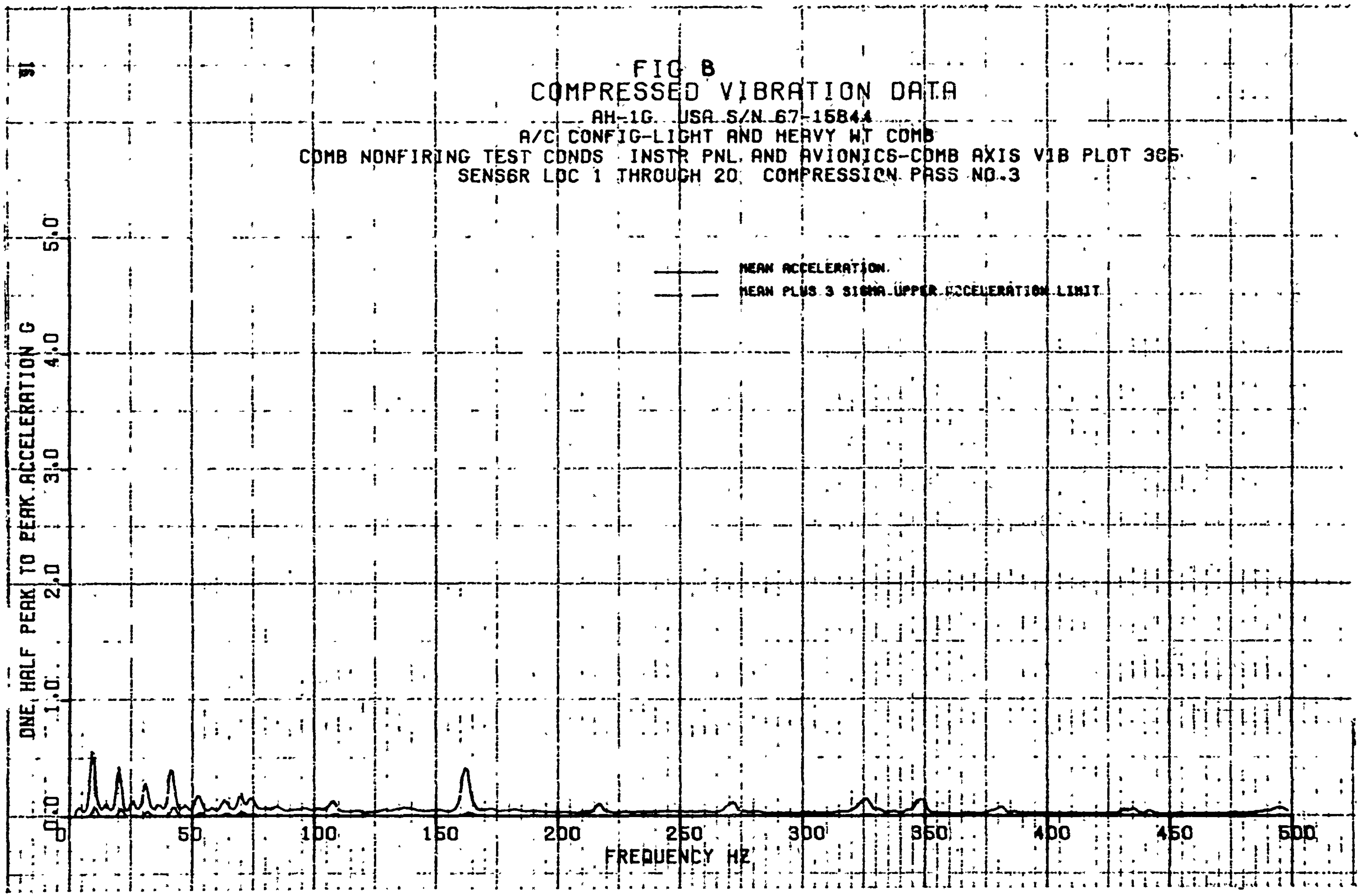


FIG C

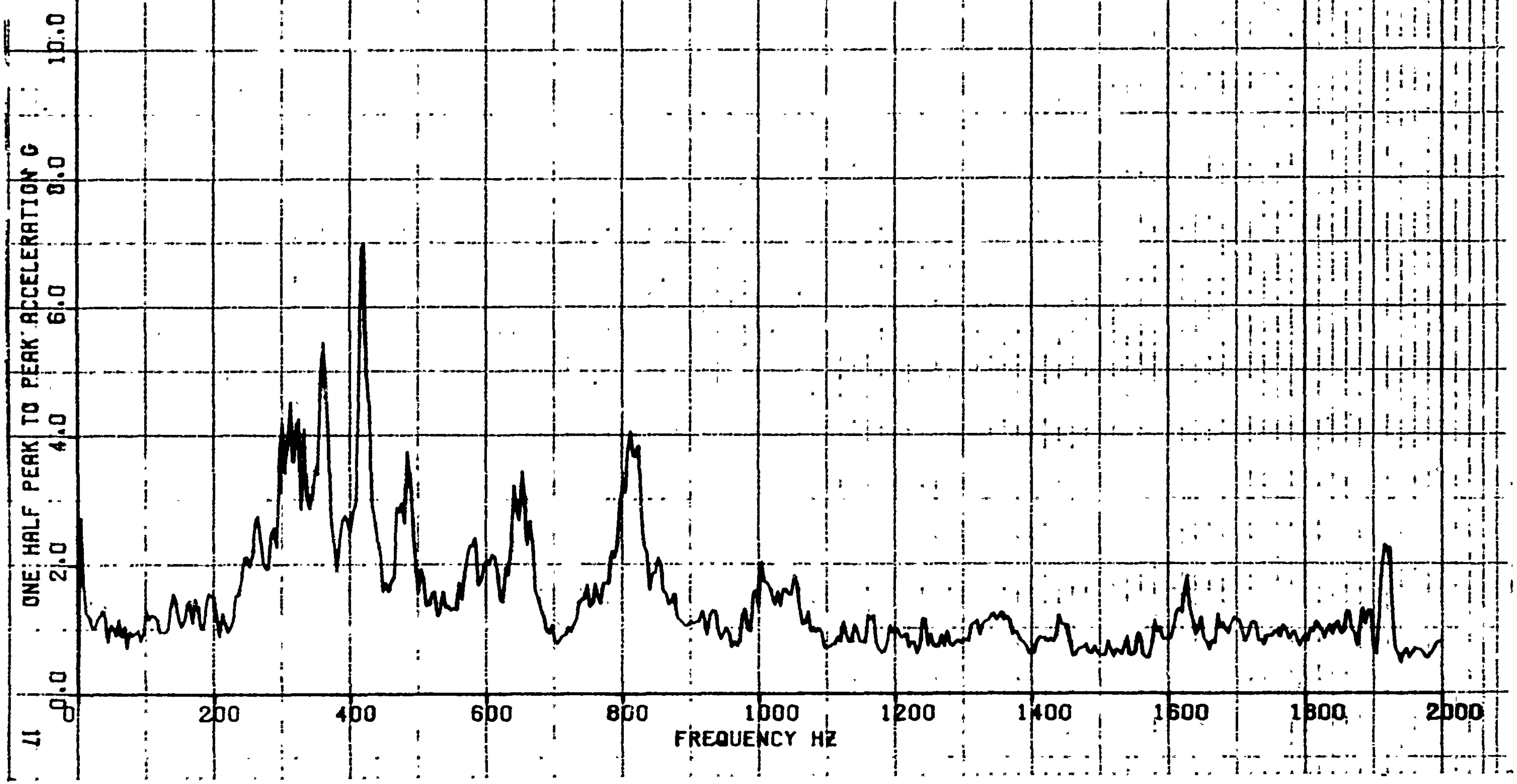
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB WEAPONS-COMB FIRING TEST CONDS INSTR PNL AND AVIONICS-COMB AXIS VIB

PLOT NO. 386 SENSOR LOC 1 THROUGH 20 COMPRESSION PASS NO.3



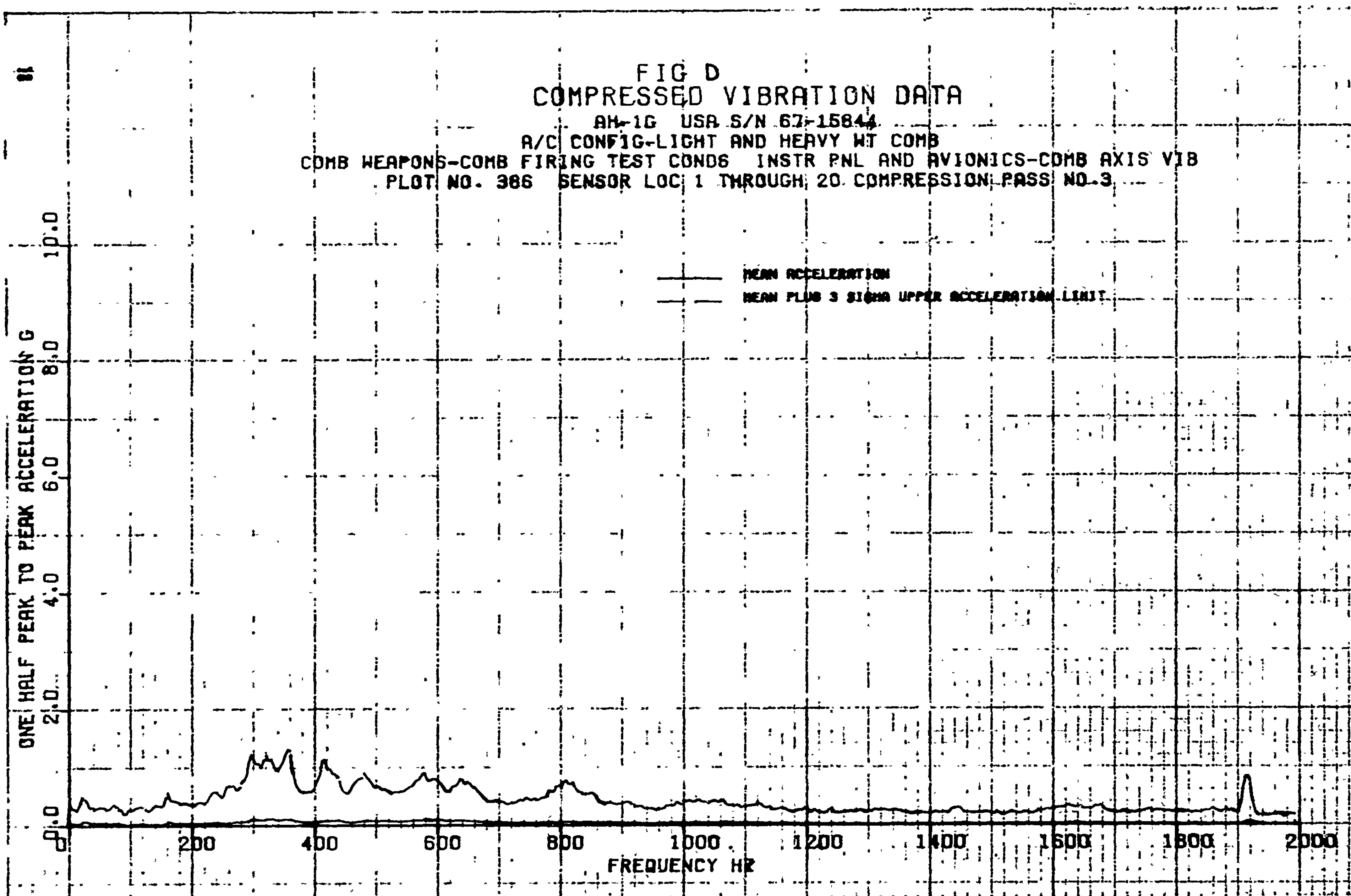


FIG D
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS INSTR PNL AND AVIONICS-COMB AXIS VIB
PLOT NO. 386 SENSOR LOC 1 THROUGH 20 COMPRESSION PASS NO 3
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
2.0
4.0
6.0
8.0
10.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

Table 5: AH-1G Vibration Sources

Main rotor speed: 324 rpm

Source		Frequency (Hz)
Main rotor	Fundamental	5.4
	2/rev	10.8
	4/rev	21.6
	6/rev	32.4
	8/rev	43.2
	10/rev	54.0
	12/rev	64.8
	14/rev	75.6
Tail rotor	Fundamental	27.6
	2/rev	55.1
	4/rev	110.2
	6/rev	165.3
	8/rev	220.4
	10/rev	275.5
Engine shaft	Fundamental	110
Tail rotor drive shaft		72
Gas producer (100%)		419
Power turbine		351
90-degree gearbox gear mesh		1072
42-degree gearbox gear mesh		1930
Main transmission, second stage		640
Main transmission lower section, drive bevel gear		1857
Main transmission, first stage		1977
XM134 7.62mm machine gun at 2000 rd/min	Fundamental	33.3
	1st harmonic	66.7
	2nd harmonic	99.9
	3rd harmonic	133.3
	4th harmonic	166.6
	5th harmonic	200.0
	6th harmonic	233.3
	7th harmonic	266.7
	8th harmonic	300.0
	9th harmonic	333.3
	10th harmonic	366.6
XM134 7.62mm machine gun at 4000 rd/min	Fundamental	66.7
	1st harmonic	133.3
	2nd harmonic	200.0
	3rd harmonic	266.7
	4th harmonic	333.3
	5th harmonic	400.0
	6th harmonic	466.9
	7th harmonic	533.6
	8th harmonic	600.3
	9th harmonic	667.0
	10th harmonic	733.7
XM129 40mm grenade launcher at 400 rd/min	Fundamental	6.6
	1st harmonic	13.6
	2nd harmonic	20.0
	3rd harmonic	26.6
	4th harmonic	33.3
	5th harmonic	40.0
	6th harmonic	46.6
	7th harmonic	53.3
	8th harmonic	60.0
	9th harmonic	66.6
	10th harmonic	73.3
XM195 20mm machine gun at 750 rd/min	Fundamental	12.5
	1st harmonic	25.0
	2nd harmonic	37.5
	3rd harmonic	50.0
	4th harmonic	62.5
	5th harmonic	75.0
	6th harmonic	87.5
	7th harmonic	100.0
	8th harmonic	112.5
	9th harmonic	137.5
	10th harmonic	150.0
2.75-inch FFAR	Fundamental	10.8
	1st harmonic	21.6
	2nd harmonic	32.4
	3rd harmonic	43.2
	4th harmonic	54.0
	5th harmonic	64.8
	6th harmonic	75.6
	7th harmonic	86.4
	8th harmonic	97.2
	9th harmonic	108.0
	10th harmonic	118.8

the vertical axis at the ARC-134 radio (location 19) during a dive at V_{NE} (fig. A). Although the maximum vibration recorded occurred at the main rotor 2/rev frequency, figure 5, appendix E, indicates that the largest vibration levels for most of the instruments and avionics occurred at the main rotor 8/rev frequency of 43.2 Hz.

16. Weapons-firing vibration data were gathered at the conditions shown in table 1. The M134 (7.62mm) machine gun vibrations were primarily harmonic below 500 Hz with discrete spectral peaks occurring at integer multiples of the gun rates of fire. Above 500 Hz, the M134 firing vibrations were more broadband, although discrete spectral peaks were still evident (figs. 117, 143, and 195, app E). The XM195 (20mm) machine gun vibrations were also primarily harmonic up to 800 Hz, above which there were no significant XM195 firing vibrations (figs. 121, 147, and 199). The XM129 (40mm) grenade launcher vibration harmonic frequencies were close to the main rotor harmonic frequencies. As a result, it was not possible to determine if XM129 firing harmonic vibrations were present. There were no significant vibrations above 140 Hz during XM129 firing (figs. 119, 145, and 197). Vibrations during 2.75-inch FFAR firing were broadband with little periodic content, but were probably masked by the 2/rev main rotor vibrations (figs. 123, 149, and 201). The weapons-firing vibration levels were higher in amplitude and frequency than the nonfiring vibrations. A maximum firing mean plus 3-sigma firing vibration level of 1.3g at 355 Hz (fig. D), compared to a maximum nonfiring mean plus 3-sigma vibration of 0.55g at 10.8 Hz, was recorded. A peak firing vibration of 7.0g at 420 Hz (fig. C) during M134 machine gun firing was recorded along the vertical axis at the gunner instrument panel left side mount.

Comparison with the Military Standard

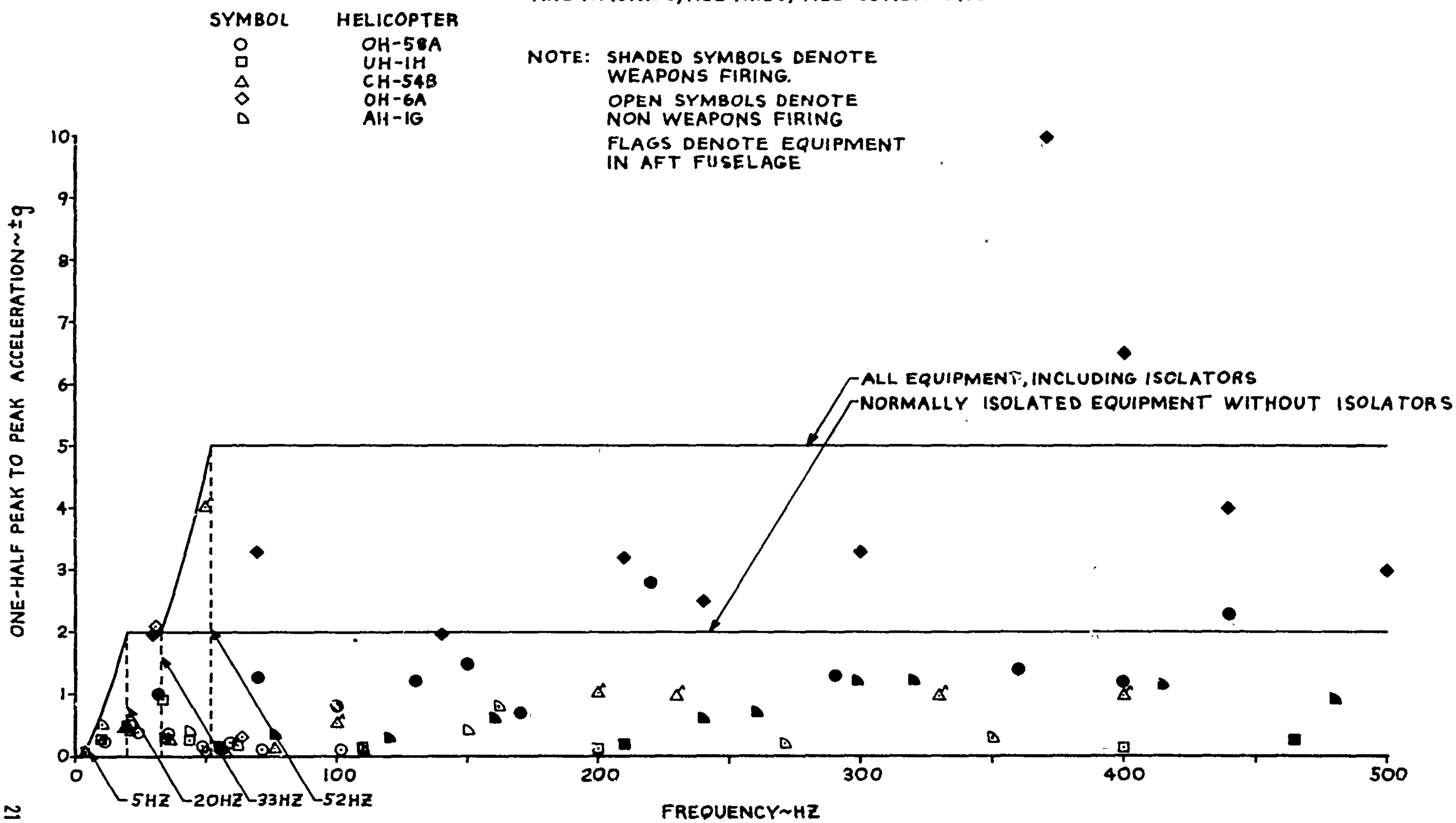
17. Figure E shows a laboratory vibration test curve for equipment installed in helicopters taken from figure 514.1-3 of MIL-STD-810B (ref 8, app A). The ordinate is changed from units of vibration amplitude as the curve is presented in MIL-STD-810B, to units of acceleration to be compatible with the data presented in this report. The significant mean plus 3-sigma acceleration limits from figures B and D are plotted on this specification curve with previously acquired OH-58A vibration data (ref 2, app A), UH-1H vibration data (ref 3), CH-54B vibration data (ref 4), and OH-6A vibration data (ref 5). This specification curve does not limit helicopter instrument and avionics vibration levels but gives vibration levels to be used for laboratory qualification of instruments and avionics for helicopter use. A data compression composed of only equipment mounted on isolators was not calculated, since the lower curve of figure E assumes that the vibration isolators will reduce vibrations above a frequency of 33 Hz, which was not the case for the vibration isolators tested. All instrument and avionics mean plus 3-sigma vibration levels are well below the test curve of MIL-STD-810B. However, the upper frequency limit of 500 Hz for MIL-STD-810B was exceeded for much of the weapons firing.

FIGURE E

LABORATORY VIBRATION TEST CURVES FOR EQUIPMENT INSTALLED IN HELICOPTERS

FROM MIL-STD-810B, FIG 514.1-3

MEAN PLUS 3-SIGMA ACCELERATION, ALL INSTRUMENTS AND AVIONICS, ALL AXES, ALL CONDITIONS



Isolation Mount Characteristics

18. The transmissibility of the vibration isolation mounts on the pilot and gunner instrument panels, the RT-857/ARC-134 VHF radio, and the R1391/ARN-83 direction finder radio was evaluated at the AH-1G firing and nonfiring driving frequencies. Transmissibility was determined by measuring the input and output accelerations across the isolation mounts and calculating the ratio of output to input acceleration. The input and output accelerations used were those determined from the mean plus 3-sigma compressions of all axes and all flight conditions. This ratio is plotted as a data point at each driving frequency in figures F through I. The isolation mounts attenuated nearly all weapons firing-induced vibrations. However, the isolation mounts on the ARC-134 and ARN-83 radios amplified vibrations induced by the main rotor, which are the primary source of nonfiring vibrations. This amplification was most significant on the ARC-134 radio, where the main rotor-induced 2/rev vibration was amplified by a factor of 3 (fig. H). This amplification caused several maximum vibrations to be recorded at the ARC-134 radio (table 3). The pilot and gunner instrument panel isolation mounts reduced weapons-firing vibrations by one-half while slightly amplifying nonfiring vibrations. Amplification of vibrations at AH-1G driving frequencies by the instrument and avionics vibration isolation mounts is a shortcoming. Improved vibration isolation for instruments and avionics should be provided.

Crew Station Vibrations

19. Pilot station vibrations were measured at the pilot collective grip, cyclic grip, right pedal foot rest, seat structure, seat pad, bite block, and helmet at the conditions shown in table 1. Gunner seat structure vibrations were also measured. Accelerometer locations and photos are described in appendix C. The second-pass data compressions are presented in figures 16 through 21 and 62 through 67, appendix E, and the first-pass data compressions are presented in figures 202 through 253. The pilot for which these data were recorded weighed 170 pounds and was 71 inches tall.

20. The transmissibility of the seat pad for nonfiring and firing conditions was evaluated by calculating the ratio of the seat pad acceleration to the seat structure accelerations at AH-1G driving frequencies. These ratios are plotted in figure J. Seat pad acceleration was measured by attaching an accelerometer to the bottom of a 10-inch by 6-inch by 0.020-inch aluminum plate on which the pilot sat. The accelerations used were those determined from the mean plus 3-sigma compressions of all axes for the seat pad and seat structure. Results indicate that the primary seat structure vibrations were reduced approximately by half in amplitude, at most frequencies, by the seat pad. This vibration attenuation by the seat pad is desirable, since it reduces the vibrations transmitted to the pilot.

21. Vibrations at the pilot's head were measured with an accelerometer attached to a bite block. The bite block was a plastic and aluminum form shaped to fit the pilot's teeth. The pilot held the bite block securely in his mouth when vibrations were recorded from this location. The ratio of the bite block acceleration to the

FIGURE F

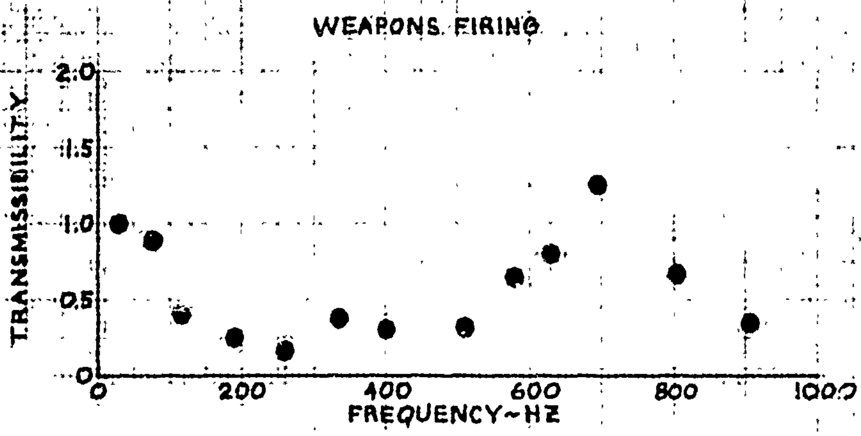
PILOT INSTRUMENT PANEL MOUNT TRANSMISSIBILITY

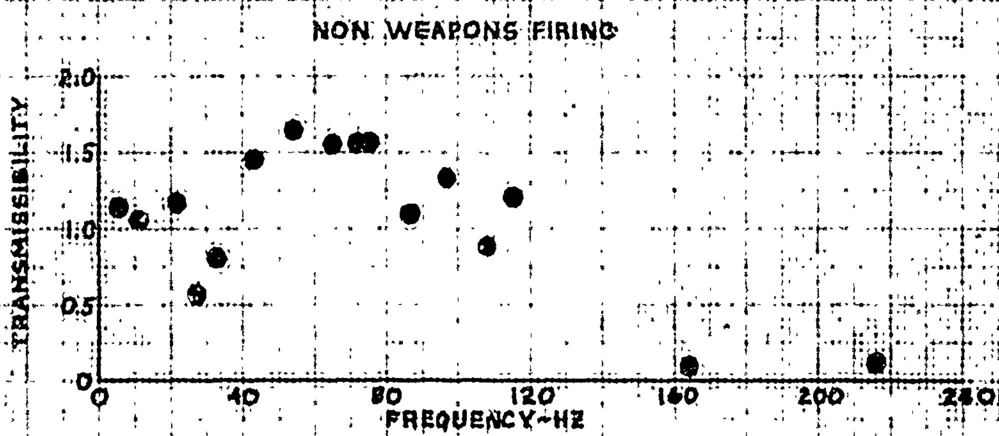
AH-1G USA S/N 67-[illegible]

ALL AXES COMBINED

ALL FLIGHT CONDITIONS

NOTE: TRANSMISSIBILITY IS THE COMBINED PILOT INSTRUMENT PANEL ACCELERATION (ACCELEROMETER LOCATIONS 1, 3, AND 5) DIVIDED BY THE COMBINED ISOLATION MOUNT ACCELERATION (ACCELEROMETER LOCATIONS 2, 4, AND 6)





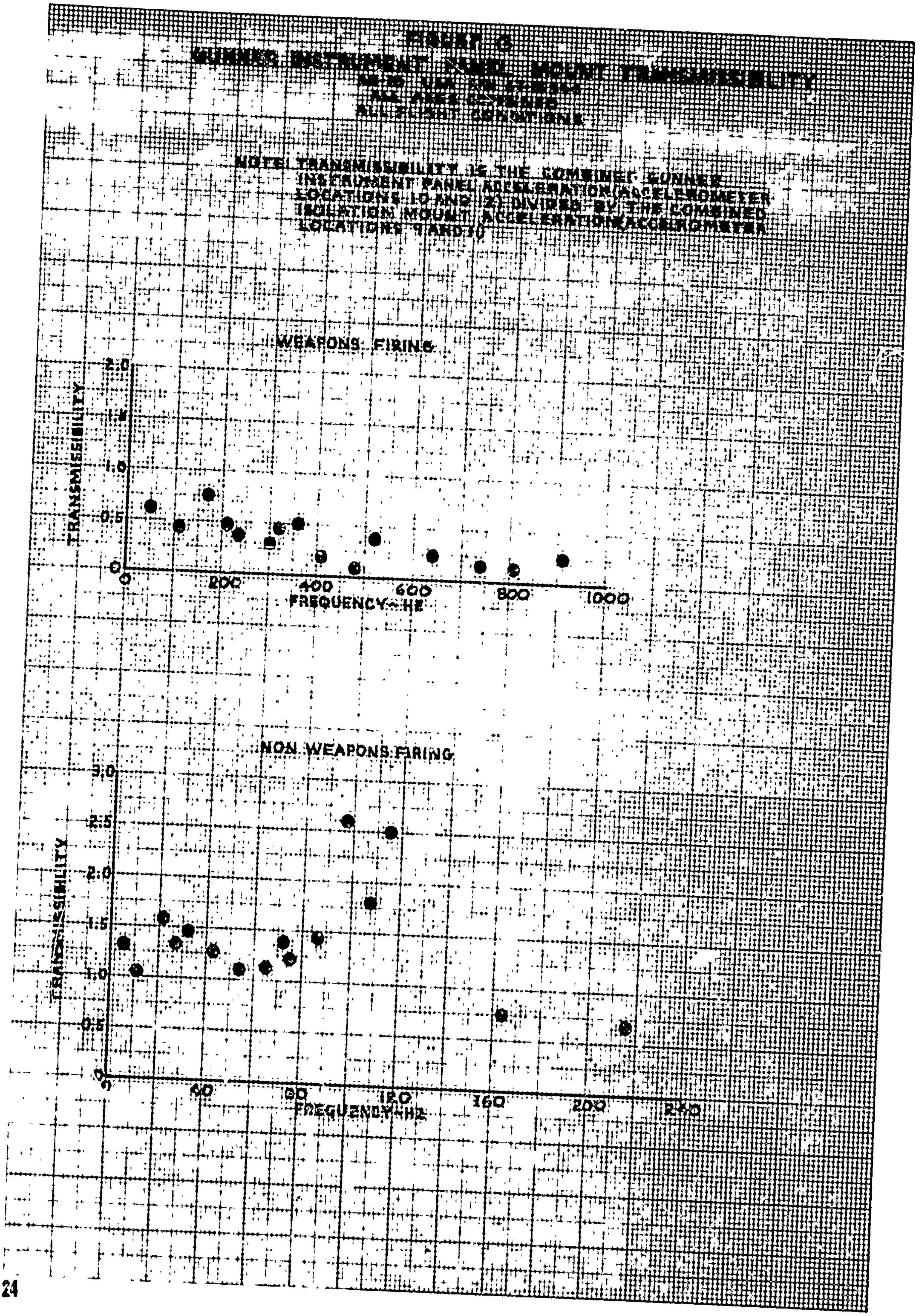
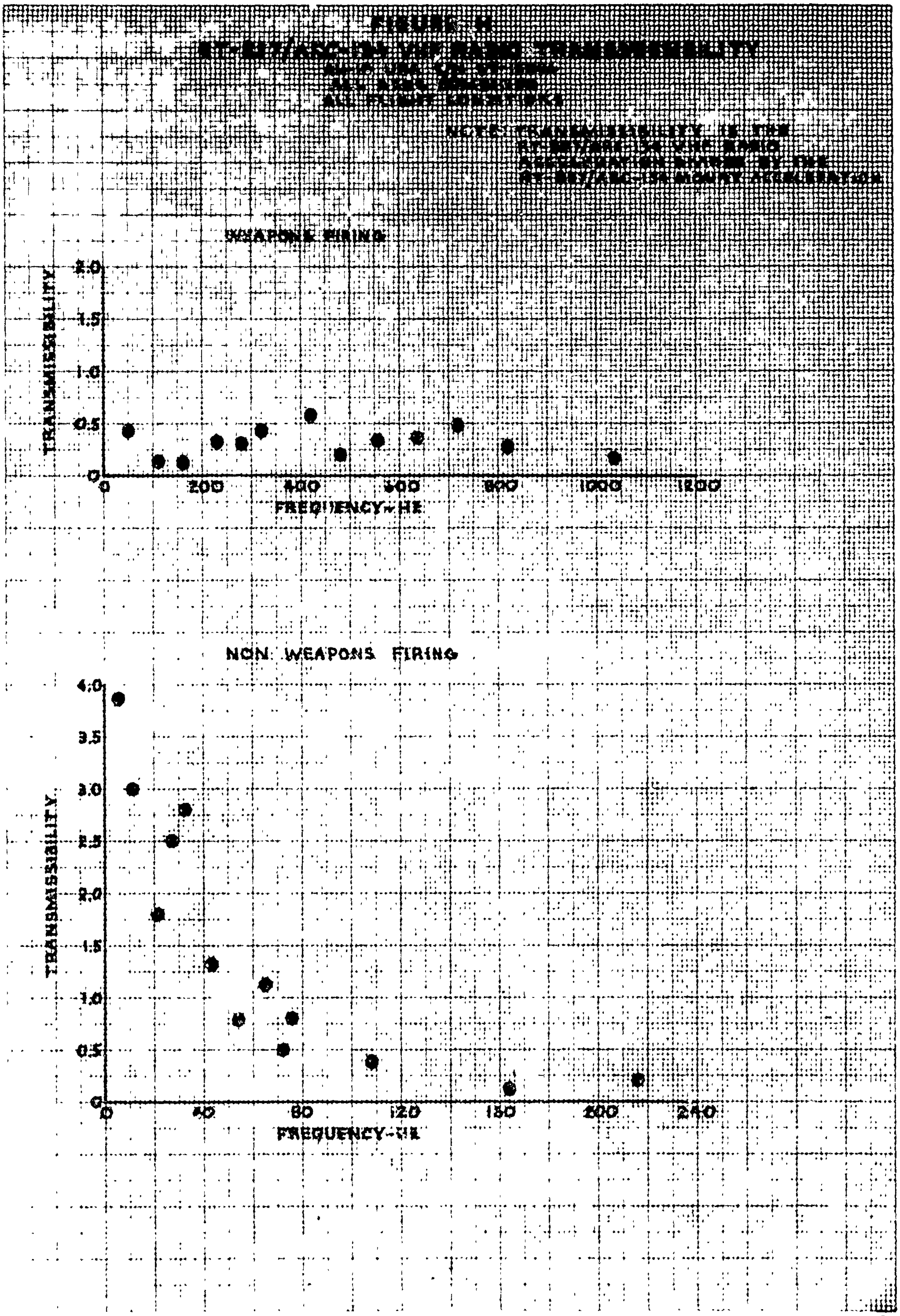


FIGURE 6
GUNNER INSTRUMENT PANEL MOUNT TRANSMISSIBILITY
ALL FLIGHT CONDITIONS
NOTE: TRANSMISSIBILITY IS THE COMBINED GUNNER INSTRUMENT PANEL ACCELERATION (ACCELEROMETER LOCATIONS 10 AND 12) DIVIDED BY THE COMBINED ISOLATION MOUNT ACCELERATION (ACCELEROMETER LOCATIONS 9 AND 10)
WEAPONS FIRING
TRANSMISSIBILITY
2.0
1.0
0.5
0
200
400
600
800
1000
FREQUENCY ~ HZ
NON WEAPONS FIRING
TRANSMISSIBILITY
3.0
2.5
2.0
1.5
1.0
0.5
0
40
80
120
160
200
240
FREQUENCY ~ HZ


WEAPONS FIRING
TRANSMISSIBILITY
2.0
1.5
1.0
0.5
0
0
200
400
600
800
1000
1200
FREQUENCY~HZ
NON WEAPONS FIRING
TRANSMISSIBILITY
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
40
80
120
160
200
240
FREQUENCY~HZ

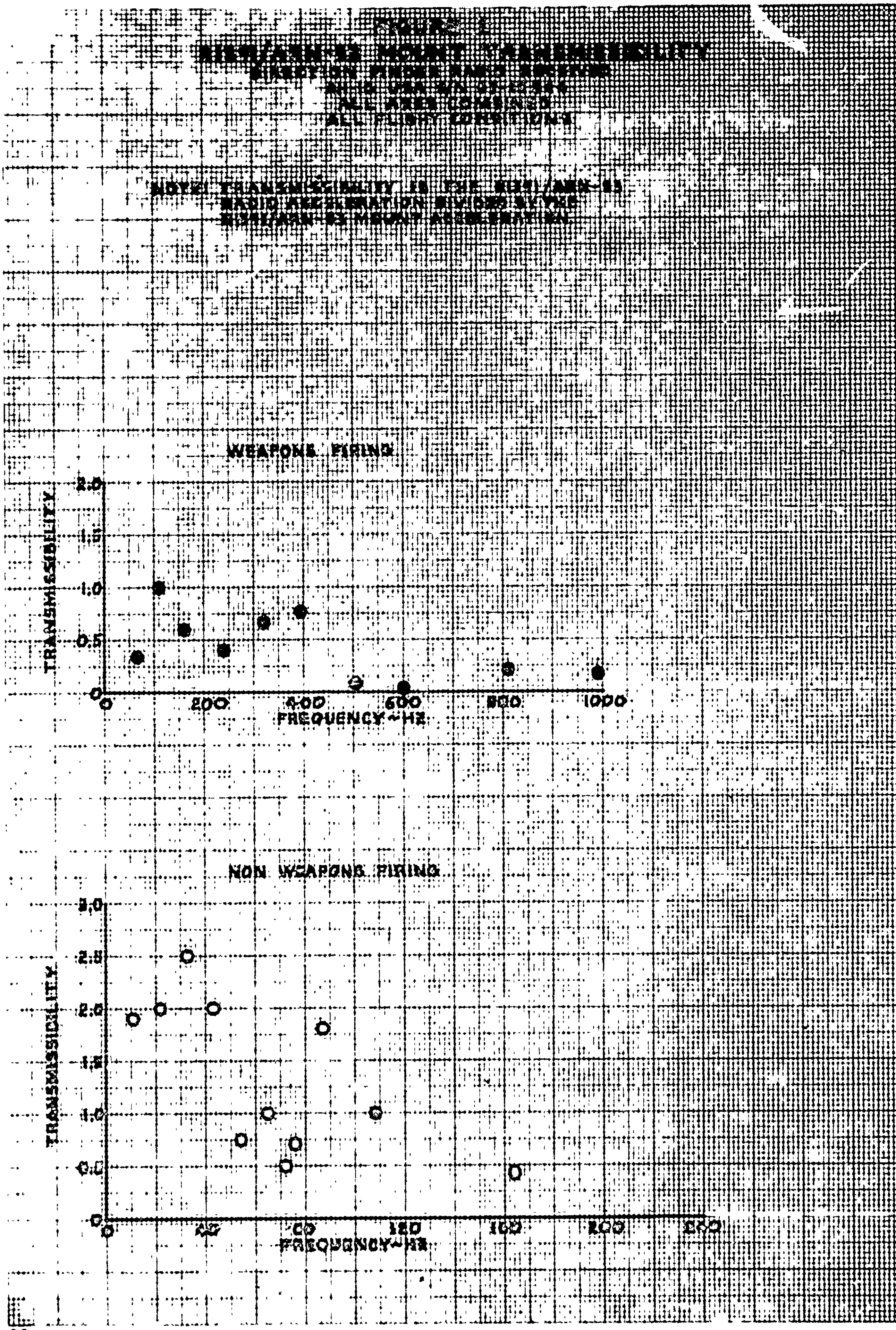

WEAPONS FIRING
TRANSMISSIBILITY
0
0.5
1.0
1.5
2.0
0
200
400
600
800
1000
FREQUENCY ~ HZ
NON WEAPONS FIRING
TRANSMISSIBILITY
0
1.0
2.0
2.5
3.0
FREQUENCY ~ HZ

FIGURE [illegible]

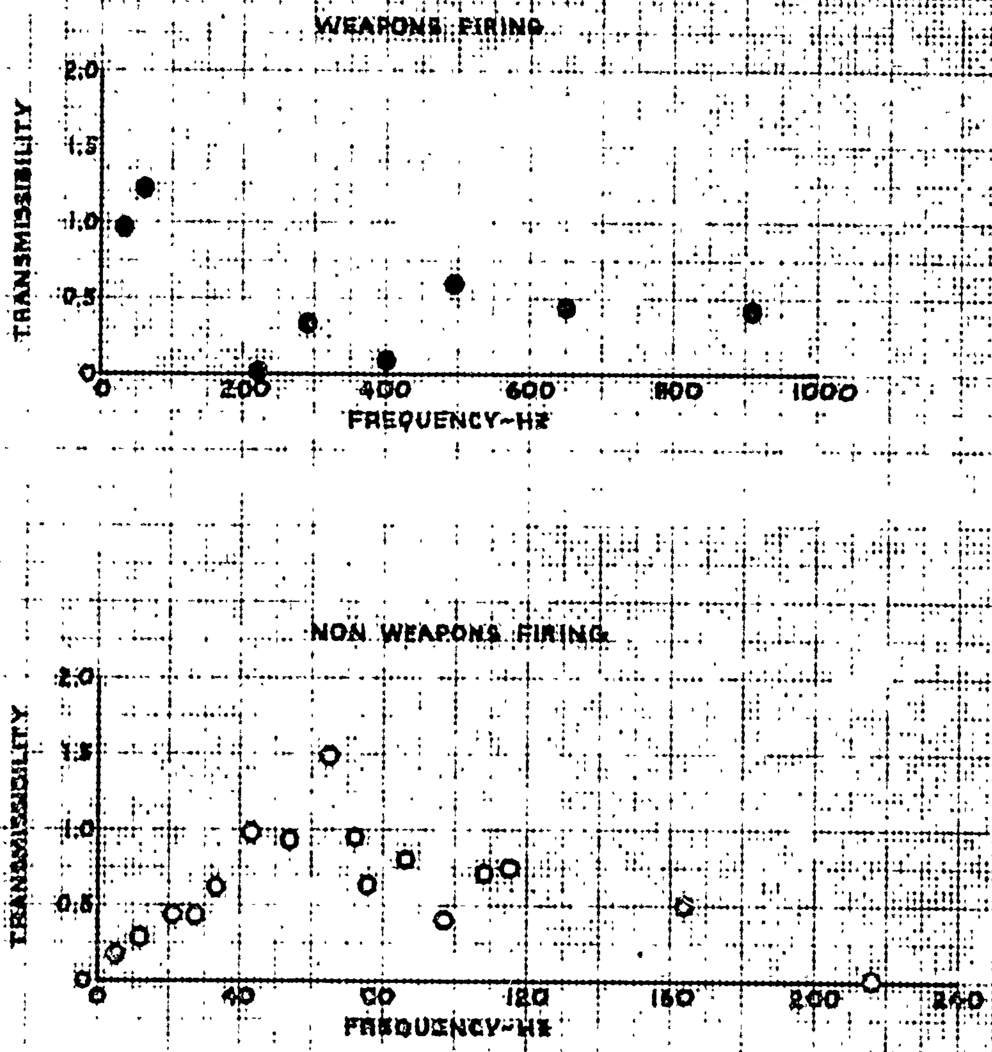
PILOT SEAT PAD TRANSMISSIBILITY

[illegible]

ALL AXES COMBINED

ALL FLIGHT CONDITIONS

NOTE: SEAT PAD TRANSMISSIBILITY IS THE SEAT PAD ACCELERATION DIVIDED BY THE SEAT STRUCTURE ACCELERATION.



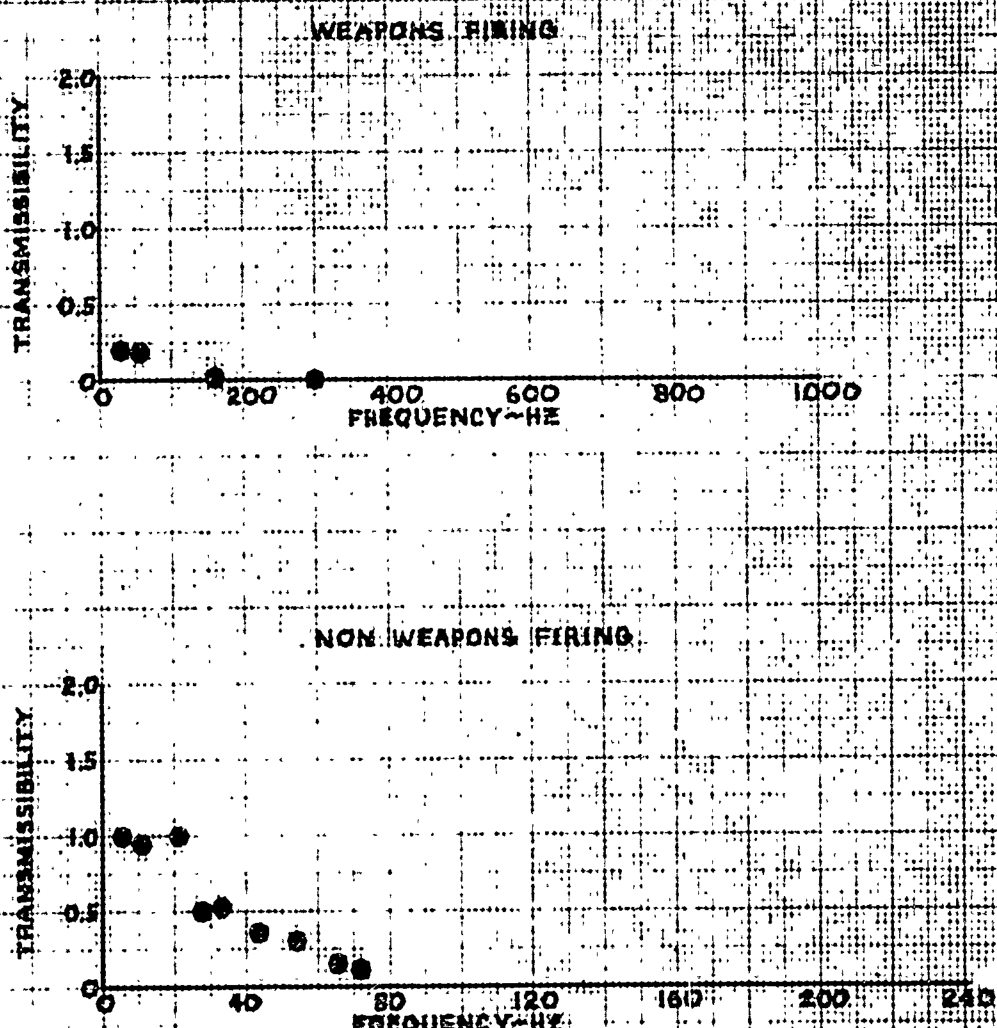
combined collective grip, cyclic grip, right pedal foot rest, seat structure, and seat pad accelerations was calculated and is presented as pilot transmissibility in figure K. The results show that the pilot's body attenuates all significant AH-1G vibrations above 22 Hz. The crew station vibration limits of paragraph 3.7.1b of MIL-H-8501A (ref 9, app A) are compared to the gunner and pilot seat structure mean plus 3-sigma accelerations for all axes in figure L. The data are divided into two groups. hover, level flight, climb, descent, and sideward flight compose one group, while takeoff, landing, and maneuvering compose the other group. There is no specification limit on vibration levels during maneuvering flight, so these data were combined with the takeoff and landing transition data, since most maneuvers are transient conditions. There is a specification vibration limit for flight from V_{cruise} to V_{limit} airspeeds but no data were grouped for this condition, since airspeeds within this range on the AH-1G helicopter are normally encountered during maneuvering flight and are transient conditions. The maximum vibration recorded for 30-knot rearward flight to V_{cruise} was 0.35g at the main rotor 8/rev (43.2 Hz) frequency, which exceeded the specification limit by 21 percent at the pilot seat. The specification flight limits were exceeded at the pilot seat at the main rotor 2/rev (10.8 Hz). 4/rev (21.6 Hz), 8/rev (43.2 Hz), and 10/rev (54.0 Hz) frequencies, and at the gunner seat at the main rotor 8/rev frequency during transition. The largest vibration recorded was 0.62g at the pilot seat, at the main rotor 8/rev frequency, which exceeded the transition specification limit by 107 percent. Vibration levels at the pilot station in excess of the limits of MIL-H-8501A are a shortcoming. Crew station vibrations were recorded during weapons firing and were generally about the same amplitude, but higher in frequency, than the main rotor-induced vibrations. There are no specification limits for crew station vibrations during weapons firing, however, crew station vibrations during weapons firing were qualitatively judged to be acceptable. Specification limits for pilot station vibrations during maneuvering flight and weapons firing are required.

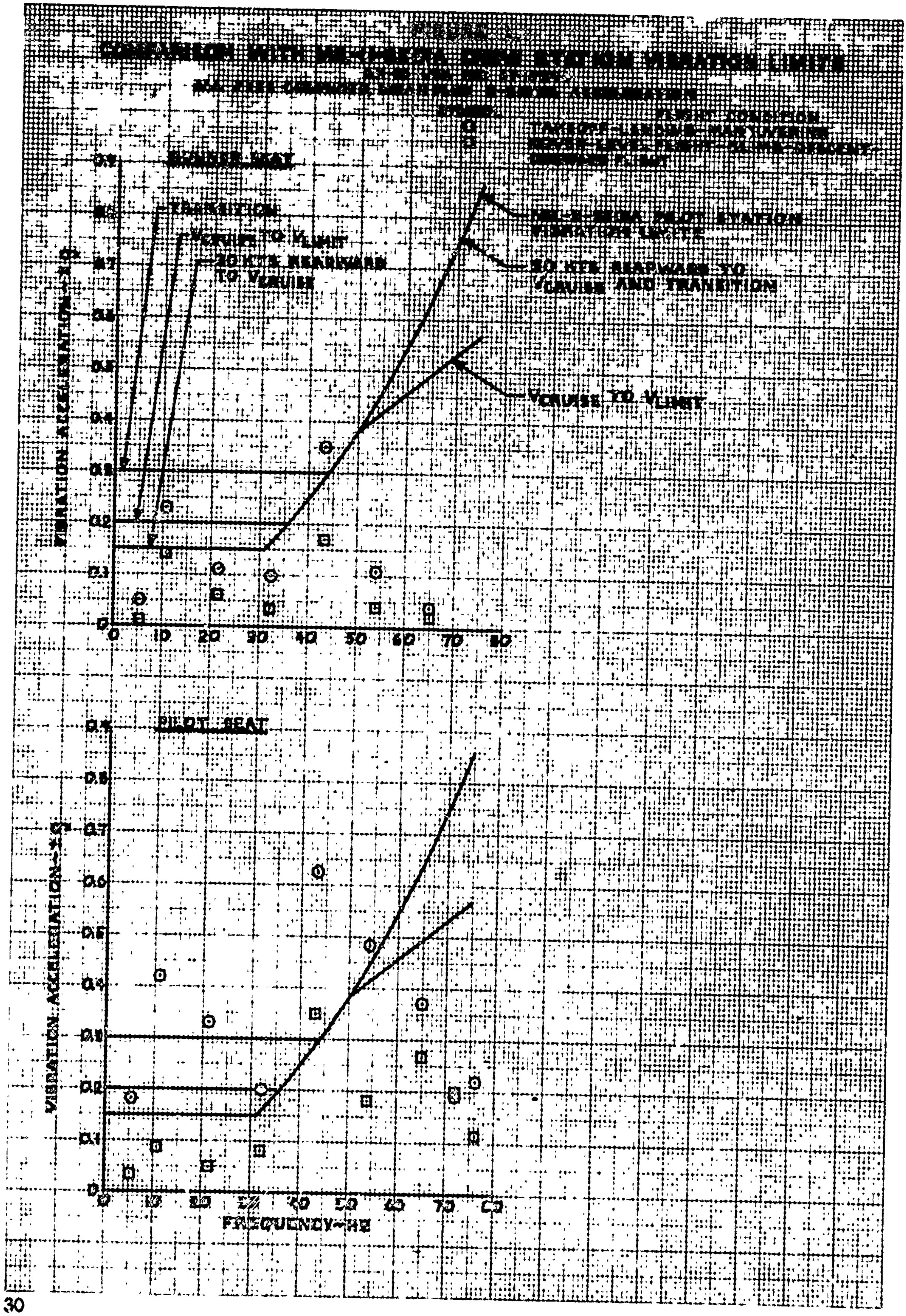
Selected Component Vibration Characteristics

22. Vibration data were recorded at 33 locations throughout the helicopter other than instrument, avionics, and crew station locations. These locations and photographs are described in appendix C. Data were recorded at the test conditions shown in table 1. These vibration data were recorded at the request of the United States Army Air Mobility Research and Development Laboratory (USAAMRDL), Eustis Directorate, and were transmitted to USAAMRDL in the Northrop Corporation data report (ref 10, app A). The selected component second-pass data are presented in this report in figures 20 through 49 and 68 through 97, appendix E. The selected component first-pass data are not presented in this report but are available from USAASTA.

FIGURE [illegible]
PILOT TRANSMISSIBILITY
[illegible]
ALL FLIGHT CONDITIONS

NOTE: PILOT TRANSMISSIBILITY IS THE [illegible] ACCELERATION DIVIDED BY THE COMBINED [illegible] SEAT STRUCTURE AND SEAT PAD ACCELERATIONS.





TRANSITION
VCRUISE TO VLIMIT
30 KTS REARWARD TO VCRUISE
30 KTS REARWARD TO VCRUISE AND TRANSITION
VCRUISE TO VLIMIT
VIBRATION ACCELERATION~±G
PILOT SEAT
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
10
20
30
40
50
60
70
80
FREQUENCY~HZ

23. The vibration characteristics at these 33 locations will not be discussed in detail but, in general, show the presence of high-level, high-frequency vibration near rotating equipment, particularly the engine and gearboxes. The maximum mean plus 3-sigma vibration acceleration level recorded was 38g at 1915 Hz at the tail rotor gearboxes (fig. 38, app E). The source of this vibration was identified as the tail rotor 42-degree gearbox mesh frequency.

Comparison with Previous Environmental Test Data

24. Vibration data gathered from the OH-58A (ref 2, app A), the UH-1H (ref 3), the CH-54B (ref 4), and the OH-6A helicopters (ref 5) are compared with AH-1G vibration data in figure E. The frequency content of the AH-1G main rotor-induced vibrations was similar to that of the UH-1H and OH-58A, which have two-bladed rotor systems, but different from that of the CH-54B and OH-6A, which have five-bladed and four-bladed rotor systems, respectively. While the CH-54B and OH-6A main rotor-induced vibrations were primarily at the main rotor first harmonic frequencies, the AH-1G main rotor-induced vibrations were significant from the main rotor first harmonic frequency (2/rev) to the main rotor fourth harmonic frequency (8/rev). Weapons-firing vibrations were similar in frequency content to those of the OH-58A and OH-6A helicopters. The overall nonfiring and firing vibration environment for the AH-1G was among the lowest of all helicopters tested.

TEMPERATURE DATA

Component Air Temperatures

25. Component part surrounding air temperatures were recorded at 18 locations described in table 3, appendix C, and shown in photographs in appendix C. Temperatures were recorded for static hot soaks in the sun, level flight between 88 and 124 knots calibrated airspeed (KCAS), and in-ground-effect (IGE) hover. The nose of the helicopter was pointed toward the sun for all temperature measurements. Temperatures were recorded in flight with the environmental control system (ECS) ON and with the ECS OFF with air vents open. Static temperatures were recorded with the cabin vents closed. Temperature data for all conditions are presented in table 6. Detailed static temperature data for locations with a temperature rise of 10°C or greater are presented in figures 254 through 262, appendix E. Temperature rise was determined by subtracting the outside air temperature from the component temperature of interest.

26. Solar radiation had a significant effect on both static and in-flight temperatures. In-flight data were obtained over a range of solar radiation values by recording data at different times of day from morning until afternoon. About 10 minutes were required for in-flight temperatures to stabilize at steady-state values. The in-flight temperature data presented in table 6 were obtained by averaging the temperature data over the range of solar radiation values tested. Static temperatures required about 2 hours to stabilize. This long stabilization time

Table 6. Average Temperature Rise.[1]

AH-1G 67-15844

Location Number	Location Name	Average Temperature Rise (~ °C)				
		In-Ground-Effect Hover		Level Flight		Static
		ECS OFF	ECS ON	ECS OFF	ECS ON	
1	Forward cockpit	12.4	12.6	10.0	4.6	50.5
2	Aft cockpit	10.8	4.0	9.1	0.8	47.0
3	Pilot instrument panel	13.6	12.8	12.5	9.9	36.5
4	Gunner instrument panel	13.3	13.5	10.6	9.2	40.5
5	Aft avionics	16.3	22.5	11.6	10.4	24.5
6	Forward transmission compartment	11.7	22.1	8.5	11.7	4.2
7	Aft transmission compartment	26.3	32.6	27.3	31.1	Zero
8	Upper engine compartment	7.9	11.1	23.8	26.7	3.5
9	Lower engine compartment	38.3	42.1	44.7	44.7	Zero
10	42-degree gearbox	19.7	16.5	13.7	12.8	32.0
11	90-degree gearbox	2.8	3.0	12.6	14.8	19.5
12	Oil cooler	9.4	9.7	10.9	12.6	1.9
13	Hanger bearing No. 1	33.9	41.8	42.5	51.6	1.7
14	Hanger bearing No. 2	39.8	46.0	36.8	33.6	19.5
15	Hanger bearing No. 3	52.5	61.2	27.9	24.0	18.5
16	Power turbine tach generator	6.9	8.9	25.9	29.6	Zero
17	Gas producer tach generator	41.3	42.8	31.3	30.3	Zero
18	Main rotor tach generator	34.6	39.7	33.0	35.4	Zero

[1]Solar radiation: 350 BTU/ft^2/hr.

required that temperatures be recorded around noon when solar radiation was nearly constant for a 2-hour period. To determine static temperatures for values of solar radiation and ambient air temperature different than those tested, an analytical method was used which is described in appendix D. Figures 254 through 262, appendix E, are the results of this analytical method, with representative solar radiation values (refs 11 and 12, app A) also shown.

27. Static temperature data for the cabin and avionics locations are tabulated at a solar radiation value of 250 BTU/hr-ft^2 and outside air temperature of 45°C in table 6. These results show that high temperatures in the forward cabin area occur under static conditions and decrease in flight due to increased air circulation. Temperatures in the engine area were low under static conditions but increased in flight due to engine heat. The high forward cabin static temperatures are due to large amounts of transparent area in the forward section of the fuselage which allow solar radiation to enter. The highest average component temperature rise recorded was 61.2°C at the tail rotor drive shaft No. 3 hanger bearing during hover.

Wet Bulb Globe Temperature Index

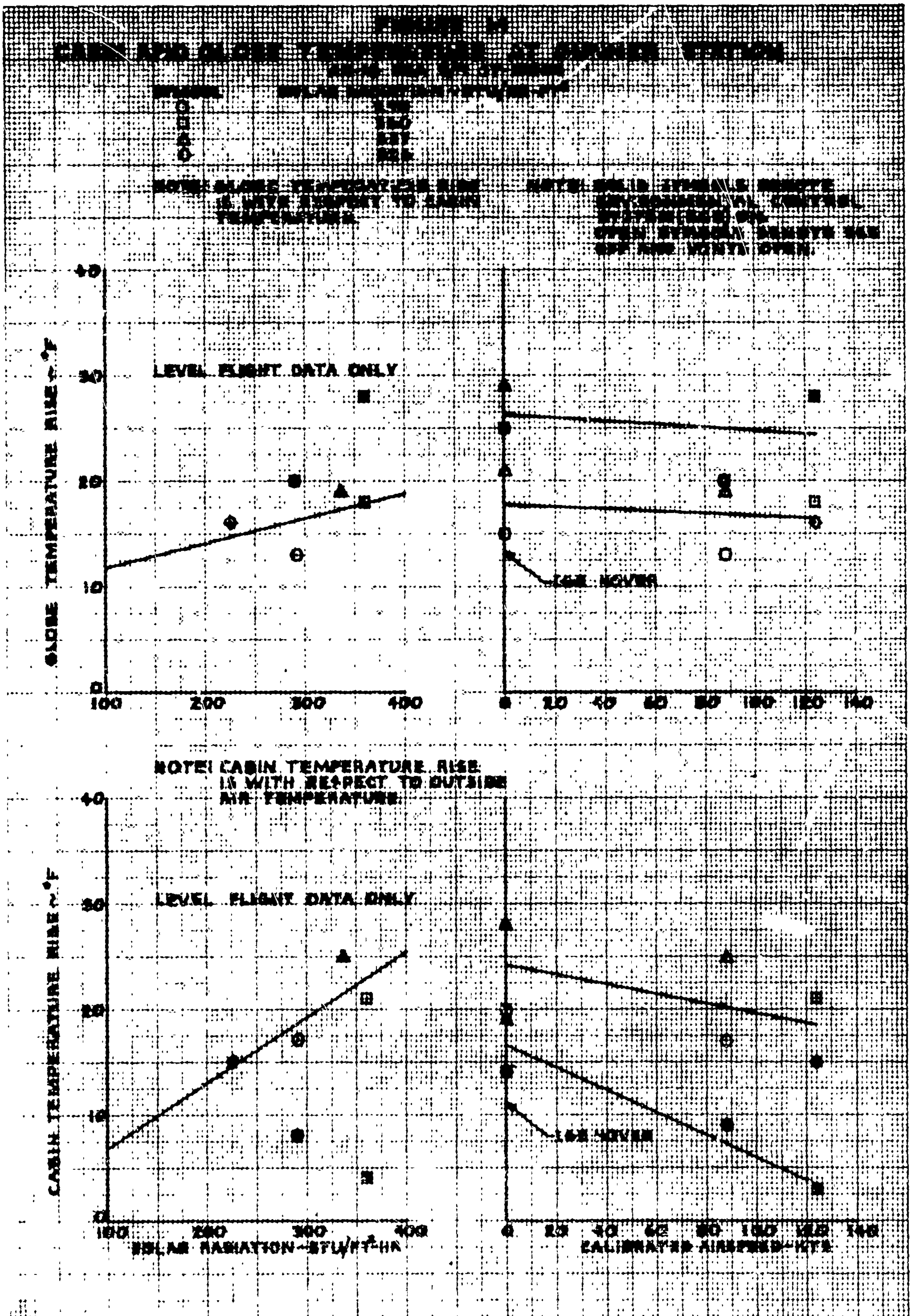
28. The Wet Bulb Globe Temperature (WBGT) index, as described in reference 13, appendix A, was recorded in flight with the ECS ON, and with the ECS OFF with all vents open. A sensing unit consisting of a dry bulb thermometer, wet bulb thermometer, and black globe thermometer was located at the copilot/gunner station in the sun. The sensing unit was obtained from the United States Army Medical Equipment Research and Development Laboratory, Fort Totten, New York, and is shown in photo 49, appendix C. Dry bulb and black globe temperatures versus solar radiation and airspeed are presented in figure M.

29. The WBGT index is used to describe the effect of the temperature environment on the human body. It is determined by adding 70 percent of the naturally convected wet bulb temperature, 20 percent of the black globe temperature, and 10 percent of the dry bulb temperature. Temperatures are in degrees Fahrenheit. The following criteria for application of the WBGT index are proposed in Department of the Army Technical Bulletin TB MED 175 (ref 13, app A):

a. When the WBGT index reaches 82°, discretion should be used in planning heavy exercise for unseasoned personnel.

b. When the WBGT reaches 85°, strenuous exercises, such as marching at standard cadence should be suspended for unseasoned personnel during their first three weeks of training. At this temperature training activities may be continued on a reduced scale after the second week of training.

c. Outdoor classes in the sun should be avoided when the WBGT exceeds 85°.



LEVEL FLIGHT DATA ONLY
GLOBE TEMPERATURE RISE ~ °F
NOTE: CABIN TEMPERATURE RISE IS WITH RESPECT TO OUTSIDE AIR TEMPERATURE.
LEVEL FLIGHT DATA ONLY
CABIN TEMPERATURE RISE ~ °F
IGE HOVER
IGE HOVER
SOLAR RADIATION ~ BTU/FT²-HR
CALIBRATED AIRSPEED ~ KTS

d. When the WBGT reaches 88°, strenuous exercise should be curtailed for all recruits and other trainees with less than 12 weeks training in hot weather. Hardened personnel, after having been acclimatized each season, can carry on limited activity at WBGT of 88° to 90° for periods not exceeding 6 hours a day.

The highest WBGT index value recorded in flight with the ECS OFF was 82.3°F at an outside air temperature of 79°F, a relative humidity of 35 percent, and a solar radiation value of 360 BTU/hr-ft^2. Based on the data presented in figure M and a psychrometric chart (app D), the WBGT index can be calculated for any combination of outside air temperatures, relative humidity, and solar radiation. For an outside air temperature of 100°F, a relative humidity of 50 percent, and a solar radiation of 250 BTU/hr-ft^2, the WBGT index would be 98.7°F at the copilot/gunner station with the ECS OFF. This calculation is described in appendix D. A WBGT index of 98.7°F is well in excess of the maximum discussed in the above criteria, and it is likely that a WBGT index higher than 98.7°F would be recorded under certain conditions with the ECS OFF. With the ECS ON, the WBGT index was not significantly lowered; however, crew comfort was qualitatively judged to be greatly increased. The ECS functions primarily by circulating refrigerated air through the pilot and copilot/gunner seat cushions and only slightly lowers the ambient cabin air temperature. The WBGT sensor measured ambient cabin air temperature conditions and did not consider the cold air circulating through the seat cushions. For this reason, the WBGT index with the ECS ON was not an accurate indication of crew comfort.

d. When the WBGT reaches 88°, strenuous exercise should be curtailed for all recruits and other trainees with less than 12 weeks training in hot weather. Hardened personnel, after having been acclimatized each season, can carry on limited activity at WBGT of 88° to 90° for periods not exceeding 6 hours a day.

The highest WBGT index value recorded in flight with the ECS OFF was 82.3°F at an outside air temperature of 79°F, a relative humidity of 35 percent, and a solar radiation value of 360 BTU/hr-ft^2. Based on the data presented in figure M and a psychrometric chart (app D), the WBGT index can be calculated for any combination of outside air temperatures, relative humidity, and solar radiation. For an outside air temperature of 100°F, a relative humidity of 50 percent, and a solar radiation of 250 BTU/hr-ft^2, the WBGT index would be 98.7°F at the copilot/gunner station with the ECS OFF. This calculation is described in appendix D. A WBGT index of 98.7°F is well in excess of the maximum discussed in the above criteria, and it is likely that a WBGT index higher than 98.7°F would be recorded under certain conditions with the ECS OFF. With the ECS ON, the WBGT index was not significantly lowered; however, crew comfort was qualitatively judged to be greatly increased. The ECS functions primarily by circulating refrigerated air through the pilot and copilot/gunner seat cushions and only slightly lowers the ambient cabin air temperature. The WBGT sensor measured ambient cabin air temperature conditions and did not consider the cold air circulating through the seat cushions. For this reason, the WBGT index with the ECS ON was not an accurate indication of crew comfort.

CONCLUSIONS

GENERAL

30. Analysis of the test results obtained during this evaluation resulted in the following conclusions:

a. The AH-1G nonfiring instrument and avionics vibrations were primarily sinusoidal, with a random variation of amplitude with time at each discrete frequency (para 15).

b. The primary source of low-frequency, nonfiring vibrations was the main rotor, with a maximum mean plus 3-sigma acceleration of 0.55g measured at the main rotor 2/rev frequency of 10.8 Hz (para 15.

c. Although the maximum vibration recorded occurred at the main rotor 2/rev frequency, the largest vibration levels for most of the instruments and avionics occurred at the main rotor 8/rev frequency of 43.2 Hz (para 15).

d. The M134 (7.62mm) and XM195 (20mm) gun firing vibrations were primarily harmonic (para 16).

e. No harmonic content was visible when firing the XM129 (40mm) grenade launcher or 2.75-inch rockets (para 16).

f. Weapons-firing vibration levels were higher in amplitude and frequency than the nonfiring vibration levels, with a maximum mean plus 3-sigma vibration of 1.3g at 355 Hz (para 16)

g. The highest instrument and avionics vibration during weapons firing was 7.0g at 420 Hz at the gunner instrument panel mount along the vertical axis during M134 (7.62mm) gun firing (para 16).

h. The amplitude limits of MIL-STD-810B were not exceeded for any test conditions; however, the frequency limits were exceeded for most of the weapons firing (para 17).

i. The instrument and avionics vibration isolation mounts attenuated most weapons firing-induced vibrations (para 18).

j. The pilot seat pad attenuates the primary seat structure vibrations (para 20)

k The pilot's body attenuates all AH-1G vibrations above 22 Hz (para 21).

l. Specification limits for pilot station vibrations during maneuvering flight and weapons firing are required (para 21).

m. The maximum mean plus 3-sigma vibration level recorded was 38g at 1915 Hz at the tail rotor drive shaft gearboxes (para 23)

n. The frequency content of the AH-1G main rotor-induced vibrations was similar to that of the UH-1H and OH-58A helicopters, but showed a higher harmonic content than the main rotor-induced vibrations of the CH-54B and OH-6A helicopters (para 24).

o. The AH-1G instrument and avionics vibration environment for both firing and nonfiring test conditions was among the lowest of all helicopters tested (para 24).

p. The highest component instrument and avionics temperatures were recorded in the cabin area under static conditions and decreased in forward flight (para 27).

q. The highest average temperature rise was 61.2°C above the outside air temperature at the tail rotor drive shaft No. 3 hanger bearing (para 27)

r. There were no deficiencies and two shortcomings noted during the testing.

SHORTCOMINGS

31. The following shortcomings were identified:

a. Amplification of vibrations at AH-1G driving frequencies by the ARC-134 and ARN-83 isolation mounts (para 18)

b. Vibration levels during nonfiring flight at the crew stations in excess of the limits of MIL-H-8501A (para 21)

RECOMMENDATIONS

32. The shortcomings should be corrected (para 31).

33. The data in this report and previous environmental test reports should be applied to revising the appropriate military environmental specifications.

34. The upper frequency limit of 500 Hz of MIL-STD-810B should be extended (para 17).

35. Improved vibration isolation mounts for instrument and avionics components should be provided (para 18).

36. The pilot station vibration limits of MIL-H-8501A should be extended to include maneuvering and weapons-firing flight conditions (para 21).

APPENDIX A. REFERENCES

1. Letter, AVSCOM, AMSAV-EF, 31 August 1971, subject: AVSCOM Test Request No. 70-15, Instrument Panel, Avionics Compartment and Crew Station Environmental Study.

2. Final Report, USAASTA, Project No. 70-15-1, *Instrument Panel and Avionics Compartment Environmental Survey, Production OH-58A Helicopter*, September 1972.

3. Final Report, USAASTA, Project No. 70-15-2, *Vibration and Temperature Survey, Production UH-1H Helicopter*, January 1973.

4. Final Report, USAASTA, Project No. 70-15-3, *Vibration and Temperature Survey, CH-54B Helicopter*, March 1973.

5. Final Report, USAASTA, Project No. 70-15-4, *Vibration and Temperature Survey, Production OH-6A Helicopter*, August 1973.

6. Technical Manual,TM 55-1520-221-10, *Operator's Manual, Army Model AH-1G Helicopter*, June 1971.

7. Test Plan, USAASTA, Project No. 70-15, *Helicopter Vibration and Environmental Survey*, July 1971.

8. Military Standard, MIL-STD-810B, *Environmental Test Methods*, 15 June 1967.

9. Military Specification, MIL-H-8501A, *Helicopter Flying and Ground Handling Qualities; General Requirements For*, 7 September 1961, amended 3 April 1962.

10. Test Data Reduction Report, Northrop Corporation Electronics Division, NORT 73-325, *Environmental Vibration Survey, AH-1G Helicopter-HueyCobra*, December 1973.

11. Publication, Instut Royale Meteorologique de Belgique, *Donnes du Rayonnement Solair a Leopoldville, Periode 1953-1962*, 1965.

12. Publication, D2-90577-2, R. A. Atlas and B. N. Charles, *Summary of Solar Radiation Characteristics, Tabular Summaries*, December 1964.

13. Department of the Army Technical Bulletin, TB MED 175, *The Etiology, Prevention, Diagnosis, and Treatment of Adverse Effects of Heat*, 25 April 1969.

APPENDIX B. AIRCRAFT DESCRIPTION

DIMENSIONS AND DESIGN DATA

Overall Dimensions

Aircraft length:	
Nose to tail skid	44.43 ft
Rotors turning	52.97 ft
Height:	
To top of rotor mast	10.19 ft
To top of turning tail rotor	13.46 ft

Main Rotor

Diameter	44.00 ft
Number of blades	2
Airfoil type	Special symmetrical section, 9.33 percent thickness
Blade chord (root to tip)	27.0 in.
Blade twist (root to tip)	-10.0 deg linear
Solidity	0.0651

Tail Rotor

Diameter	8.50 ft
Number of blades	2
Airfoil type	NACA 0015
Blade chord (root to tip)	8.41 in.
Blade twist (root to tip)	Zero deg

Operating Limitations

Engine power (continuous)	1400 shp
Transmission rating (continuous)	1100 shp
Turbine outlet temperature (30 minutes)	645°C
Turbine outlet temperature (continuous)	625°C
Rotor speed (power ON)	294 to 324 rpm
Rotor speed (power OFF)	294 to 339 rpm
Maximum airspeed (sea level, clean)	190 kt
Maximum gross weight	9500 lb

Gear Ratio

Engine to main rotor	20.370:1
Engine to tail rotor	3.990:1

Figure 1. Helicopter Diagram

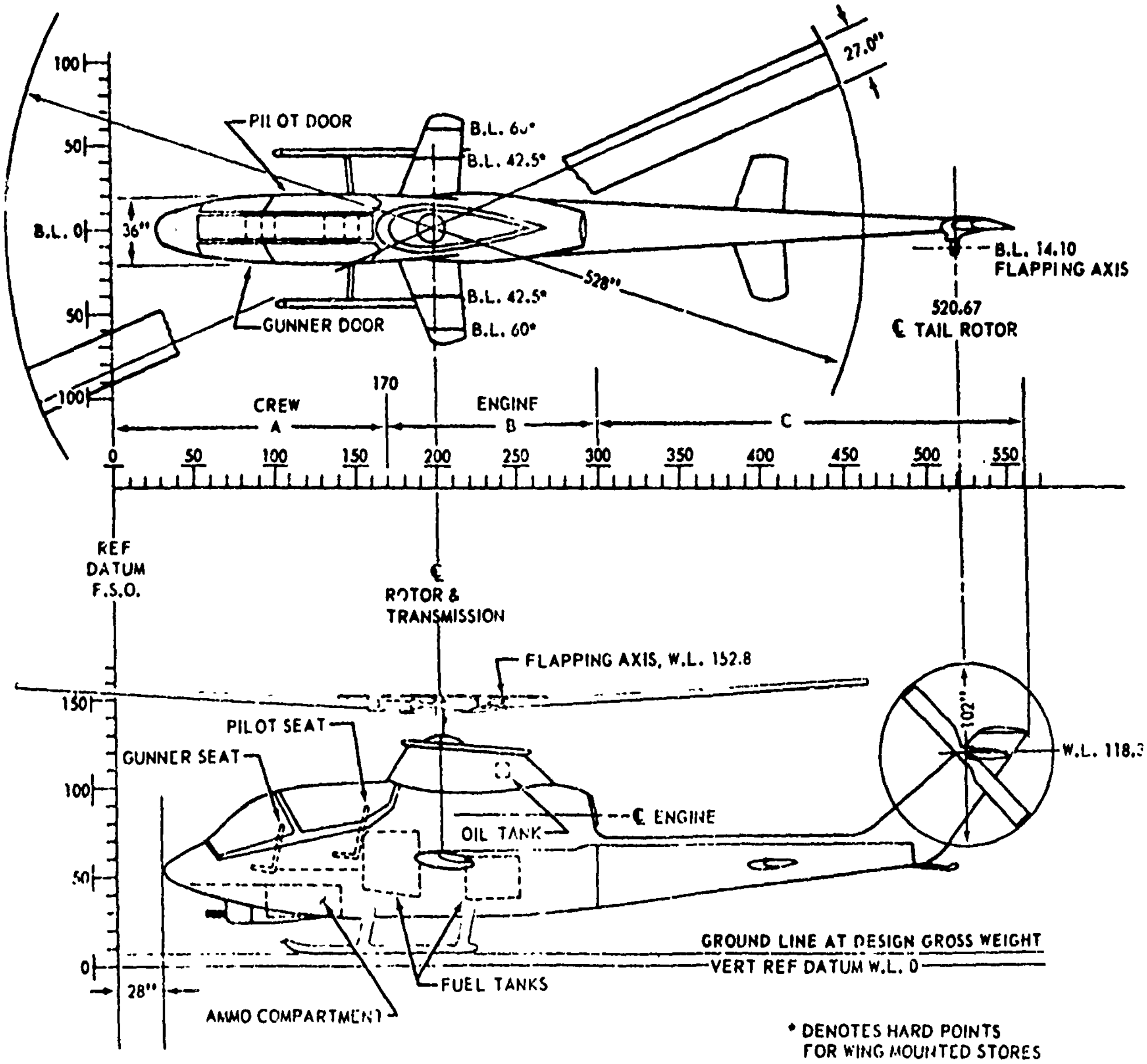
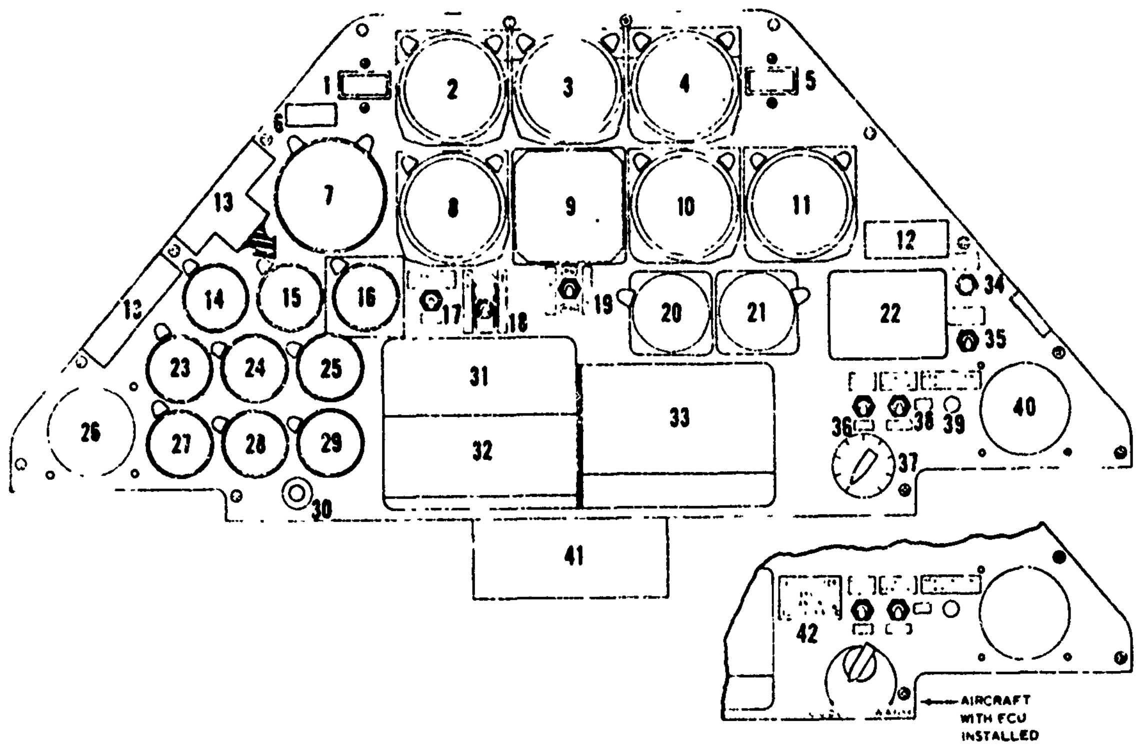
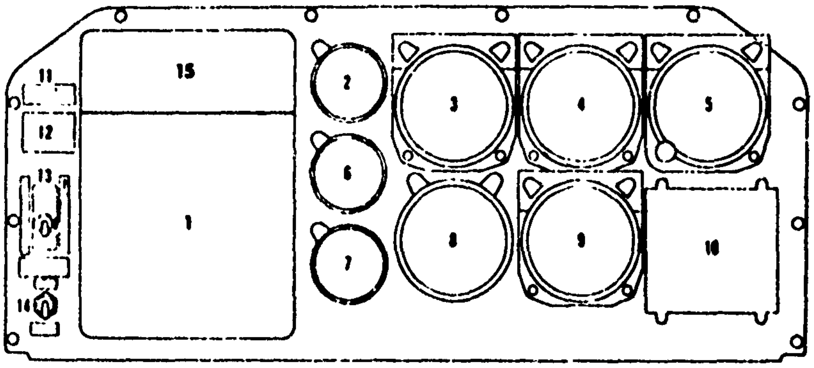


Figure 2.
Pilot Instrument Panel Configuration. AH-1G S/N 67-15844



1. Master Caution Light
2. Airspeed Indicator
3. Attitude Indicator
4. Pressure Altimeter
5. RPM Warning Light
6. Radio Call Letters
7. Dual Tachometer
8. Turn and Slip Indicator
9. Radio Magnetic Indicator
10. Vertical Velocity Indicator
11. Course Indicator
12. Transmitter Selector Decal
13. GO NO GO Placard
14. Exhaust Gas Temperature
15. Gas Producer Tachometer
16. Torque Meter
17. Emergency Collective Hydraulic Switch
18. Wings Stores Jettison Switch-Emergency
19. Compass Slaving Switch
20. Clock
21. Volt-Ammeter Indicator
22. Ash Tray
23. Fuel Pressure Indicator
24. Transmission Oil Temperature Indicator
25. Engine Oil Temperature Indicator
26. Air Vent
27. Fuel Quantity Indicator
28. Transmission Oil Pressure Indicator
29. Engine Oil Pressure Indicator
30. Fuel Gauge Test Switch
31. Turret Control Panel
32. Wing Stores Control Panel
33. ARC-54 Control Panel
34. IFF Mode 4 Indicator Light
35. Code Hold Switch
36. Pitot Heat Switch
37. Temperature Selector Control
38. Rain Removal - Heat (ENVR CONT) Switch
39. Heat and Vent Control
40. Air Vent
41. 20MM Control Panel
42. ECU Decal

Figure 3.
Gunner Instrument Panel Configuration. AH-1G S/N 67-15844



1. VHF Radio and Signal Distribution Panel
2. Torque Meter
3. Airspeed Indicator
4. Attitude Indicator
5. Pressure Altimeter
6. Gas Producer Tachometer
7. Exhaust Gas Temperature Indicator
8. Dual Tachometer
9. Radio - Magnetic Indicator
10. Caution Panel
11. Radio Call Letters
12. Interphone Panel XMTR Select Data
13. Wing Stores Jettison Switch
14. Emergency Collective Hydraulic Switch
15. 20MM Control Panel when Installed

Table 1. Light Test Configuration.

Item	Weight (lb)	Longitudinal Fuselage Station (in.)	Lateral Fuselage Station (in.)	Longitudinal Moment (in.-lb)	Lateral Moment (in.-lb)
Basic aircraft	5943	202.5	.13, right	1,203,345	768
Average fuel	1092	203.1	Zero	222,000	Zero
Instrumentation	200	245.0	Zero	49,000	Zero
Pilot	175	135.0	Zero	23,625	Zero
Engineer	150	83.0	Zero	12,450	Zero
Test conditions	7560	199.8	.1, right	1,510,420	768

Table 2. Heavy Test Configuration.

Item	Weight (lb)	Longitudinal Fuselage Station (in.)	Lateral Fuselage Station (in.)	Longitudinal Moment (in.-lb)	Lateral Moment (in.-lb)
Basic aircraft	5943	202.5	.13, right	1,203,345	768
Average fuel	1414	203.0	Zero	287,000	Zero
Instrumentation	200	245.0	Zero	49,000	Zero
M159C rocket pods	260	199.2	Zero	51,800	Zero
2.75-inch FFAR	288	195.1	Zero	56,200	Zero
Ballast	250	115.0	Zero	28,750	Zero
Pilot	175	135.0	Zero	23,625	Zero
Engineer	150	83.0	Zero	12,450	Zero
Test conditions	8680	197.3	.09, right	1,712,170	768

Table 3. M134 (7.62mm) Machine Gun Firing.

Item	Weight (lb)	Longitudinal Fuselage Station (in.)	Lateral Fuselage Station (in.)	Longitudinal Moment (in.-lb)	Lateral Moment (in.-lb)
Basic aircraft	5943	202.5	.13, right	1,203,345	768
Average fuel	1054	203.0	Zero	214,000	Zero
Instrumentation	200	245.0	Zero	49,000	Zero
Average 7.62mm ammunition	288	117.5	10.0, right	33,840	2880
Pilot	175	135.0	Zero	23,625	Zero
Engineer	150	83.0	Zero	12,450	Zero
Test conditions	7810	196.7	.47, right	1,536,260	3648

Table 4. M129 (40mm) Grenade Launcher Firing.

Item	Weight (lb)	Longitudinal Fuselage Station (in.)	Lateral Fuselage Station (in.)	Longitudinal Moment (in.-lb)	Lateral Moment (in.-lb)
Basic aircraft	5943	202.5	.13, right	1,203,345	768
Average fuel	1147	203.5	Zero	234,000	Zero
Instrumentation	200	245.0	Zero	49,000	Zero
Average 40mm ammunition	185	117.5	-10.0, left	21,738	-1850
Pilot	175	135.0	Zero	23,625	Zero
Engineer	150	83.0	Zero	12,450	Zero
Test conditions	7800	197.9	-.14, left	1,544,158	-1082

Table 5. 2.75-Inch Rocket Firing.

Item	Weight (lb)	Longitudinal Fuselage Station (in.)	Lateral Fuselage Station (in.)	Longitudinal Moment (in.-lb)	Lateral Moment (in.-lb)
Basic aircraft	5943	202.5	.13, right	1,203,345	768
Average fuel	1104	203.6	Zero	224,000	Zero
Instrumentation	200	245.0	Zero	49,000	Zero
M159C rocket pods	260	199.2	Zero	51,800	Zero
2.75-inch FFAR	288	195.1	Zero	56,200	Zero
Pilot	175	135.0	Zero	23,625	Zero
Engineer	150	83.0	Zero	12,450	Zero
Test conditions	8120	199.7	.09, right	1,620,420	768

Table 6. XM35 (20mm) Machine Gun Firing.

Item	Weight (lb)	Longitudinal Fuselage Station (in.)	Lateral Fuselage Station (in.)	Longitudinal Moment (in.-lb)	Lateral Moment (in.-lb)
Basic aircraft	5943	202.5	.13, right	1,203,345	768
Average fuel	1200	203.8	Zero	244,500	Zero
Instrumentation	200	245.0	Zero	49,000	Zero
XM35 armament subsystem	550	200.0	Zero	110,000	Zero
Average 20mm ammunition	252	197.3	Zero	49,720	Zero
Pilot	175	135.0	Zero	23,625	Zero
Engineer	150	83.0	Zero	12,450	Zero
Test conditions	8470	199.8	.09, right	1,692,640	768

APPENDIX C. TEST INSTRUMENTATION

GENERAL

1. Flight test instrumentation was installed, calibrated, and maintained by instrumentation personnel of USAASTA and USAAMRDL. This instrumentation was used to record vibration data, temperature data, and flight condition parameters. A list of the instrumentation components is presented in table 1.

VIBRATION INSTRUMENTATION

2. An FM-FM magnetic tape system was used to record the vibration data. A block diagram of the instrumentation system is presented in figure 1. Data were recorded over a frequency range of 2 to 2000 Hz for all flight conditions. The transducers were miniature triaxial, biaxial, and uniaxial piezoelectric accelerometers which were mounted at 61 locations throughout the aircraft for a total of 120 channels of vibration data. The instrumentation was limited to recording data from 12 accelerometers simultaneously. To record more than 12 channels of data, an eight-position manual switching network was employed and each flight condition was recorded for each switch position, for a maximum data capacity of 96 channels. To obtain the total of 120 channels of vibration data, the accelerometers were relocated after completion of all test conditions and the test conditions were repeated. The maximum capacity of the instrumentation system is 96 channels without accelerometer relocation and 192 channels with one relocation. Accelerometers were bonded to the component of interest with the accelerometer axis aligned to the component axis. The mounting locations of each accelerometer are shown in photos 1 through 44. Table 2 lists the accelerometer locations, accelerometer type, and amplitude range.

3. The vibration instrumentation was calibrated to determine the amplitude sensitivity and frequency response of the total data system. A frequency sweep was performed on each accelerometer with an electrodynamic shaker. Each accelerometer was mounted back to back with a calibrated reference accelerometer and the charge sensitivity, picocoulomb/g, and frequency response of the test accelerometer determined by comparison with the reference accelerometer. The airborne data recording system was calibrated by means of a charge source. For each channel, the charge source was set to simulate a given acceleration value by reference to the accelerometer charge sensitivity determined by the shaker calibration, and the airborne data system output was recorded. The ground station was calibrated separately from the airborne system, and the two system scale factors were combined to obtain an overall data system scale factor. It is estimated that the accuracy of the total vibration measurement system, both airborne and ground units, is within ±10 percent of the true acceleration amplitude.

Table 1. Instrumentation Component Description.

Nomenclature	Manufacturer	Quantity	Model Number
Piezoelectric accelerometer (triaxial)	Endevco	29	2228C
Piezoelectric accelerometer (uniaxial)	Endevco	3	2226C
Line driver	MB Electronics	89	9402216
Amplifier	MB Electronics	12	N400
Switching relays	Potter and Brumfield	24	JDT27DD1
FM rack	Electro Mechanical Research	2	--
FM rack voltage code oscillator (VCO)	Electro Mechanical Research	12	307A-02
FM rack mixing amplifier	Electro Mechanical Research	2	311A-02-1
FM rack reference oscillator	Electro Mechanical Research	2	313A-01
Tape recorder	Ampex Corporation	1	10-286
Time code generator	Electro Mechanical Research	1	CL24D-27.6A
Thermocouple switch (24 channels)	Thermo Electric	1	33113
Thermocouple indicator	Newport Laboratories	1	2600
Thermocouple wire (iron-constantan)	Series J	--	--
Thermal radiometer	Teledyne Geotech	1	TCH-188-01

FIGURE 1
AIRBORNE DATA SYSTEM

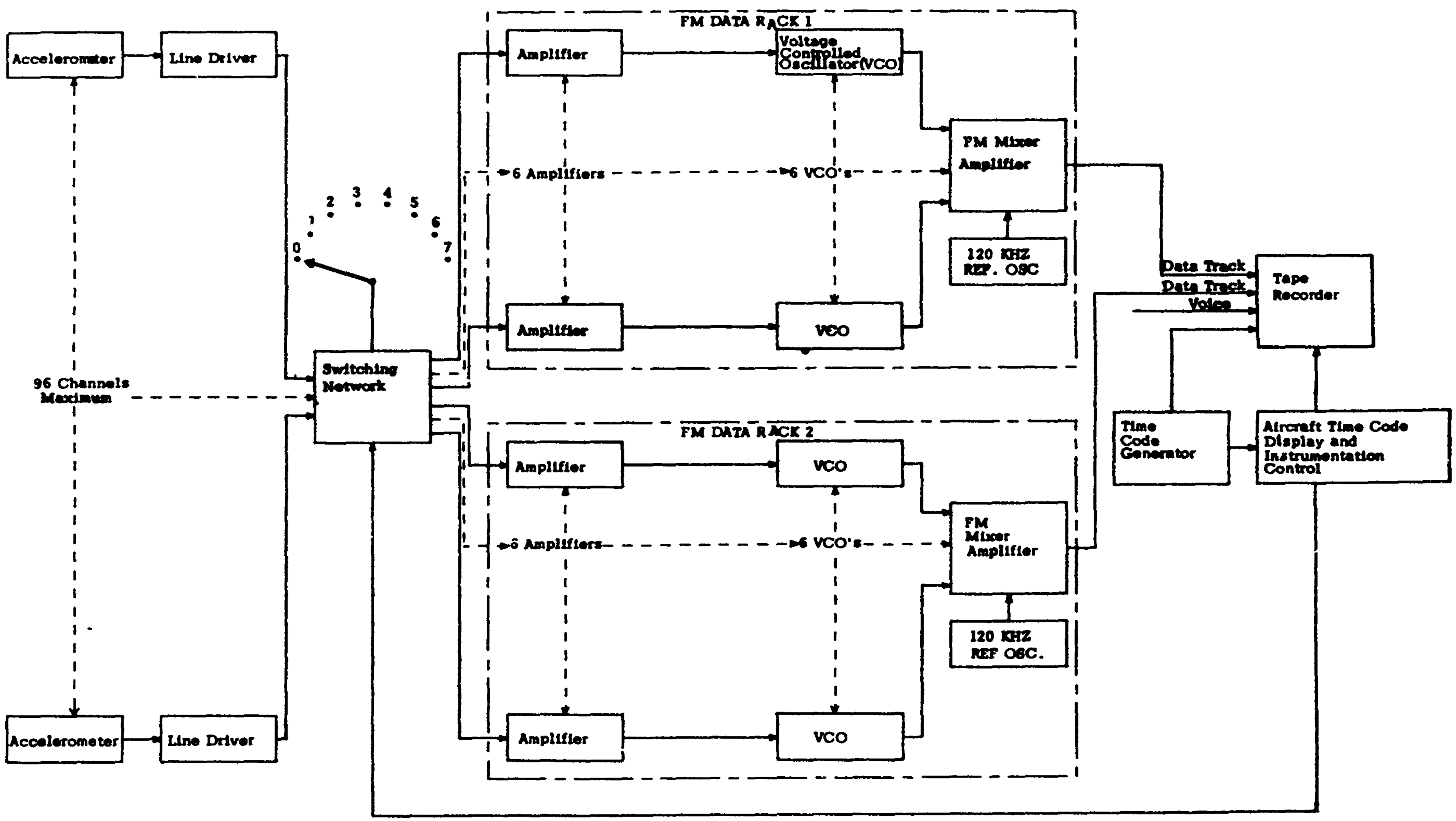


Table 2. Accelerometer Locations.

Location	Location Number	Fuselage Station (in.)	Water Line (in.)	Buttline (in.)	Axes	Full Scale Acceleration Range (±g) Nonfiring	Firing	Accelerometer Types
Pilot instrument panel								
Panel	1	113.0	76.3	-12.9	3	5	17	2228C
Mount	2	112.3	76.6	-13.6	3	5	17	2228C
Panel	3	111.4	85.6	Zero	3	5	17	2228C
Mount	4	110.6	85.0	-0.3	3	5	17	2228C
Panel	5	113.0	76.3	12.2	3	5	17	2228C
Mount	6	112.3	76.6	12.9	3	5	17	2228C
Panel	7	112.8	77.6	Zero	3	5	17	2228C
Panel	8	112.6	78.5	7.0	3	5	17	2228C
Gunner instrument panel								
Panel	9	57.4	65.5	-10.0	3	5	17	2228C
Mount	10	57.2	64.6	-10.9	3	5	17	2228C
Panel	11	57.4	65.5	10.0	3	5	17	2228C
Mount	12	57.2	64.6	10.7	3	5	17	2228C
Panel	13	58.0	64.9	3.6	3	5	17	2228C
Avionics								
Gunner gun sight	14	70.1	67.3	Zero	3	5	17	2228C
Turret electronic components	15	69.5	51.8	10.4	3	5	17	2228C
SCAS sensor amplifier	16	159.7	81.0	-7.3	3	5	17	2228C
ARN-83 radio	17	276.9	44.8	-10.7	3	5	17	2228C
ARN-83 radio mount	18	276.9	43.1	-10.7	3	5	17	2228C
ARC-134 radio	19	364.8	53.9	-1.3	3	5	17	2228C
ARC-134 radio mount	20	364.8	51.5	-1.3	3	5	17	2228C
Human factors								
Gunner seat structure	21	93.0	53.3	Zero	3	5	17	2228C
Pilot seat pad plate	22	139.5	65.0	Zero	3	5	17	2228C
Pilot seat structure	23	135.0	60.3	Zero	3	5	17	2228C
Pilot right footrest	24	104.1	55.1	8.6	Vertical, lateral	5	17	2228C
Pilot collective grip	25	125.6	75.8	-14.0	vertical	5	17	2226C
Pilot cyclic grip	26	125.7	75.1	-2.7	3	5	17	2228C
Pilot helmet	27	--	--	--	3	5	17	2228C
Pilot bite block	28	--	--	--	3	5	17	2228C
Lift link	29	197.4	66.7	-0.3	3	5	50	2226C
Tach generators								
Main rotor	30	201.0	70.1	-1.0	3	50	50	2228C
Power turbine (N_2)	31	240.1	89.7	-10.5	3	17	50	2228C
Gas producer (N_1)	32	239.5	77.1	3.4	3	50	50	2228C
Transmission								
Left forward mount	33	192.2	73.2	-12.5	3	17	50	2228C
Right forward mount	34	192.2	73.2	12.5	3	17	50	2228C
Right aft mount	35	209.2	73.6	12.5	3	17	50	2228C
Left aft mount	36	209.2	73.6	-12.5	3	50	50	2228C
Transmission case	37	213.6	97.7	Zero	3	167	167	2228C
Engine								
Left forward mount	38	233.3	81.5	-7.8	3	17	50	2228C
Left aft mount	39	254.2	78.5	-12.3	3	17	50	2228C
Right mount	40	254.2	78.5	11.7	3	17	50	2228C
Engine deck	41	241.9	65.1	Zero		17	50	2228C
Engine forward firewall	42	230.1	75.4	Zero	3	50	50	2228C
Hanger bearings								
No. 1	43	273.4	69.7	-2.2	Vertical, lateral	50	50	2226C
No. 2	44	335.8	69.7	-2.2	Vertical, lateral	50	50	2228C
No. 3	45	399.5	69.7	-2.2	Vertical, lateral	50	50	2228C
Tail rotor gearboxes								
42-degree gearbox	46	470.1	70.5	Zero	3	50	50	2228C
90-degree gearbox	47	520.7	114.7	3.4	3	50	50	2228C
Tail boom attach points								
Upper left	48	297.0	67.0	-13.0	3	5	50	2228C
Lower right	49	299.4	32.5	13.0	3	5	50	2228C
Collective servo mount	50	208.6	67.5	-9.5	3	50		2228C
Elevator tip, right	51	395.5	58.2	40.4	3	50		2228C
Navigation lights								
Left wing tip	52	211.7	58.9	-62.3	3	50	50	2228C
Tail	53	471.8	57.4	-6.3	3	50	50	2228C
Gun mounts								
Turret	54	69.1	34.8	-2.7	3	167	167	2228C
Left wing	55	190.5	63.6	-44.0	3	167	167	2228C
Engine case								
Front	56	239.7	96.4	Zero	3	50	50	2228C
Mid	57	256.2	98.7	Zero	3	50	50	2228C
Aft	58	266.0	96.1	Zero	3	50	50	2228C
Fuselage skin								
Nose	59	55.0	41.8	Zero	Vertical	167	167	2226C
Left forward side	60	77.9	53.8	-16.5	Lateral	167	167	2226C
Mid forward side	61	119.8	54.7	-17.6	Lateral	167	167	2226C

TEMPERATURE INSTRUMENTATION

4. Temperature data were recorded by mounting thermocouples at 18 locations throughout the helicopter. The temperatures were displayed on one temperature indicator which was switched to the desired thermocouple. Table 3 lists the locations of the thermocouples and the temperature measurement equipment is described in table 1. Thermocouple locations are presented in photos 2, 3, 18 through 20, 26, 28 through 32, 41, and 45 through 50. Solar radiation was recorded on the ground with a calibrated radiometer. Outside air temperature (OAT) was recorded with a laboratory thermometer for static temperature measurements and with the ship's OAT indicator for in-flight temperature measurement.

FLIGHT CONDITION PARAMETERS

5. The parameters listed in table 4 were hand-recorded from the ship's standard instruments to determine the flight condition. The readability for each instrument listed in table 4 was determined by dividing the smallest increment marked on the dial by 5.

Table 3. Thermocouple Locations.

Location	Location Number	Fuselage Station (in.)	Water Line (in.)	Buttline (in.)
Forward cockpit	1	89.2	97.1	8.3
Aft cockpit	2	151.8	104.1	8.3
Pilot instrument panel	3	106.9	77.8	Zero
Gunner instrument panel	4	54.8	64.3	Zero
Aft avionics	5	356.1	66.6	Zero
Forward transmission compartment	6	191.0	77.2	Zero
Aft transmission compartment	7	211.3	71.6	Zero
Upper engine compartment	8	239.5	105.4	Zero
Lower engine compartment	9	246.9	64.8	Zero
42-degree gearbox	10	469.5	68.6	Zero
90-degree gearbox	11	519.5	114.1	3.4
Oil cooler area	12	267.7	47.9	Zero
Hanger bearing No. 1	13	274.9	69.7	-2.2
Hanger bearing No. 2	14	337.3	69.7	-2.2
Hanger bearing No. 3	15	401.1	69.7	-2.2
Power turbine tach generator	16	240.4	91.3	-9.2
Gas producer tach generator	17	239.5	78.4	4.5
Main rotor tach generator	18	201.1	71.6	Zero

Table 4. Flight Condition Parameters.

Parameter	Range of Interest	Readability
Airspeed	20 to 190 knots	±1.0 knot
Altitude	Zero to 10,000 feet	±4.0 feet
Outside air temperature	Zero to 30°C	±0.4°C
Main rotor speed	294 to 324 rpm	±2.0 rpm
Gas producer speed	60 to 101.5 percent	±0.2 percent
Fuel quantity	Zero to 1700 pounds	±4.0 pounds

INSTRUMENTATION PHOTOGRAPHS

INDEX

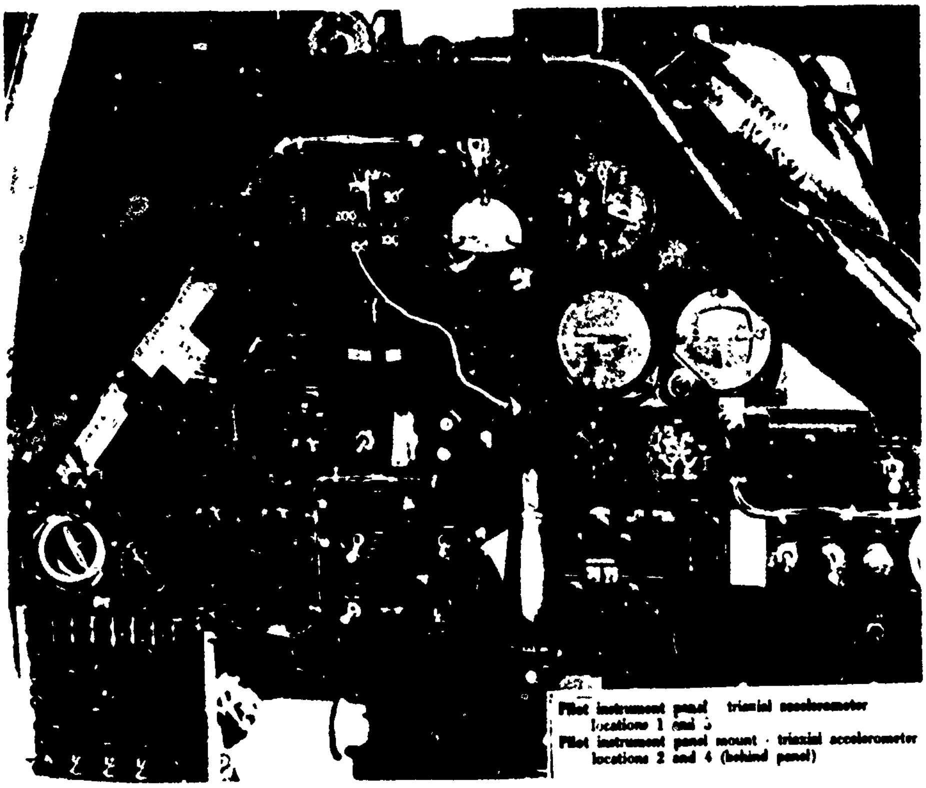


Photo 1.

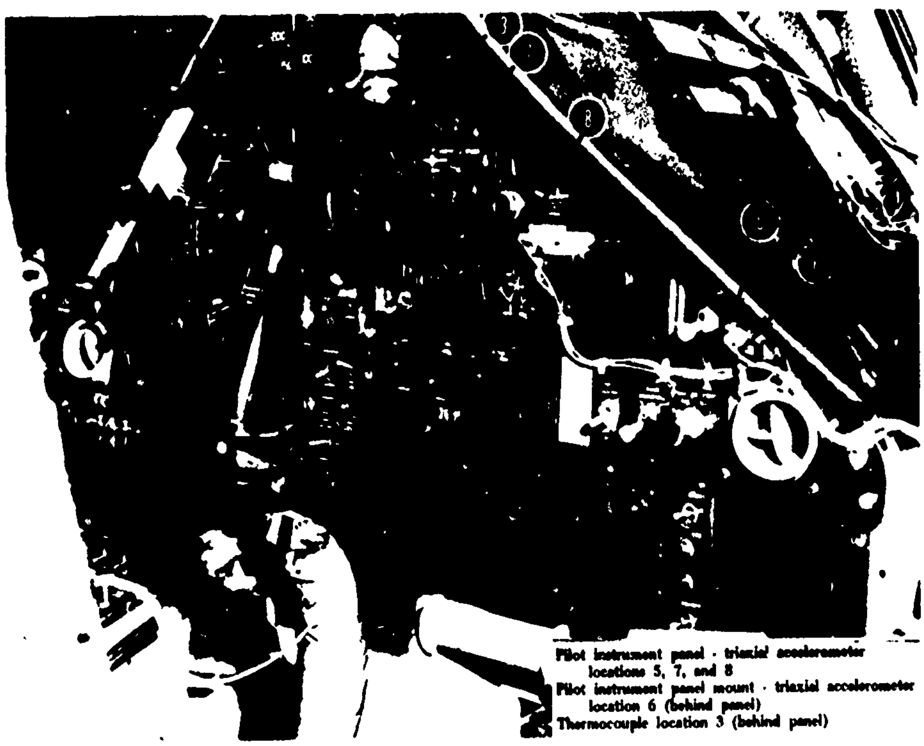
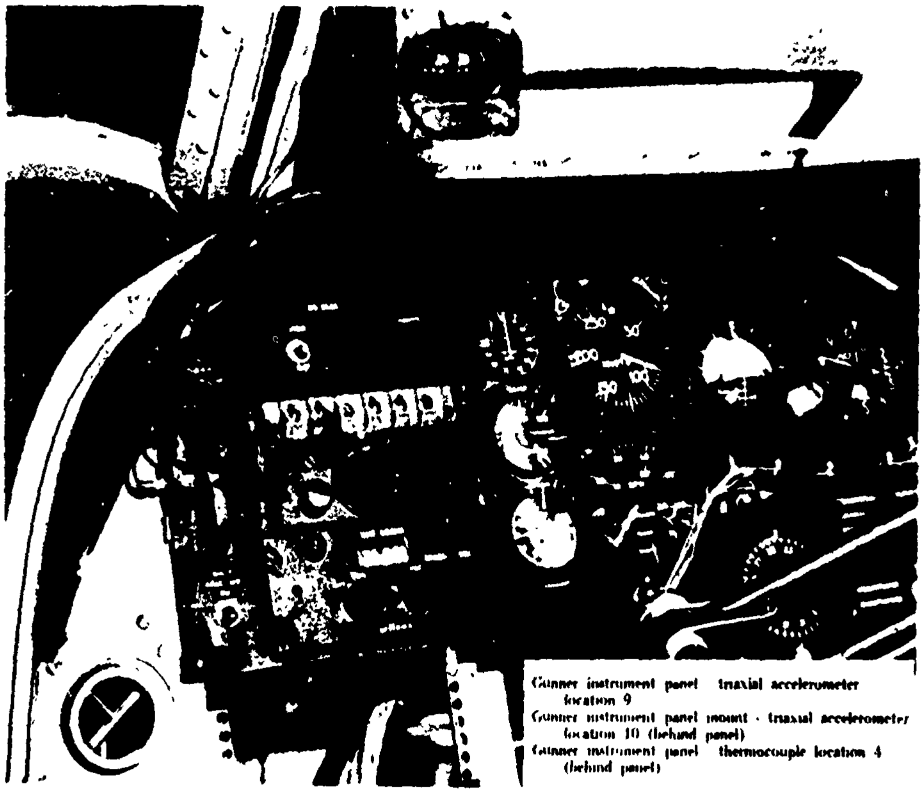


Photo 2.



Gunner instrument panel - triaxial accelerometer location 9
Gunner instrument panel mount - triaxial accelerometer location 10 (behind panel)
Gunner instrument panel - thermocouple location 4 (behind panel)

Photo 3.

Gunner instrument panel - triaxial accelerometer locations 11 and 13
Gunner instrument panel mount - triaxial accelerometer location 12 (behind panel)

Photo 4.

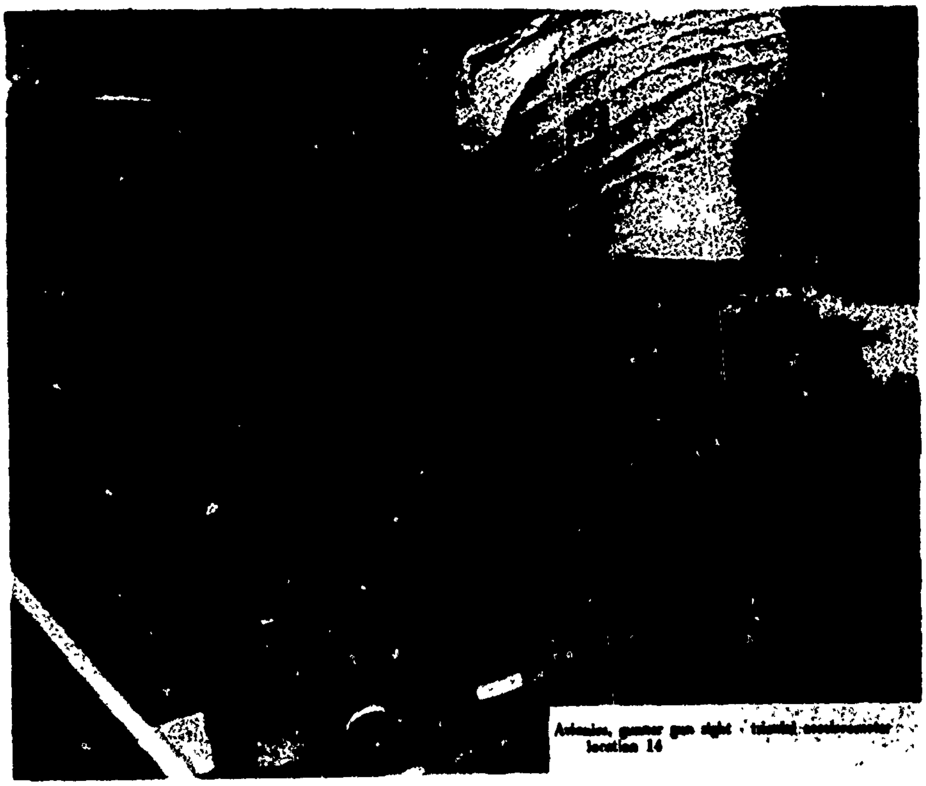
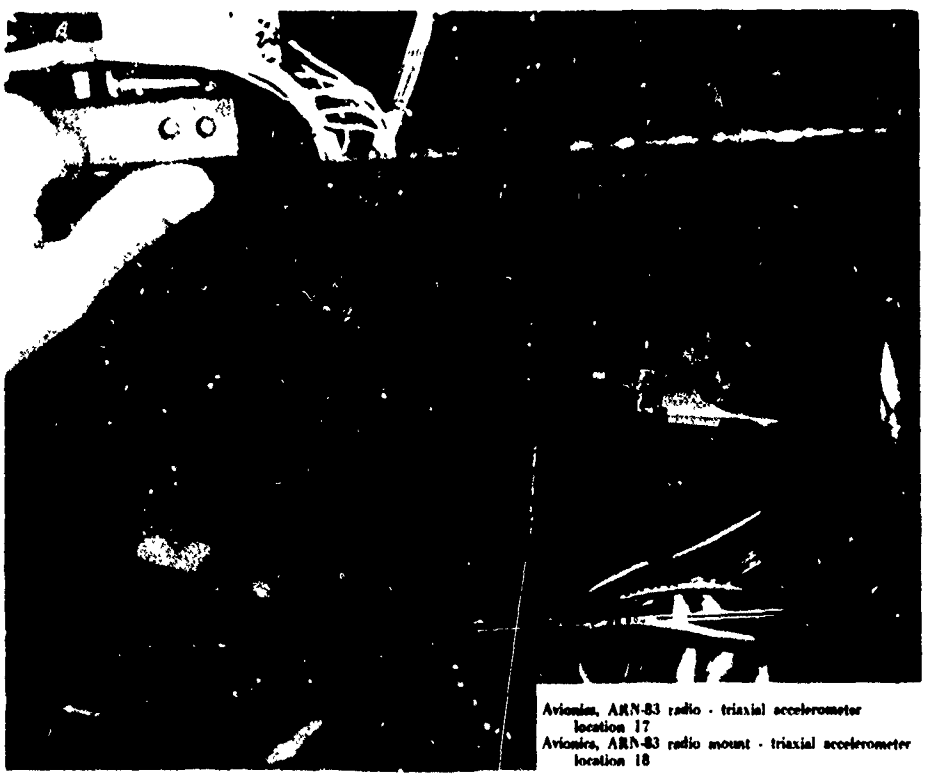


Photo 5.

Photo 6.

Avionics, SCAS sensor amplifier - triaxial accelerometer location 16 (not shown)

Photo 7.



Avionics, ARN-83 radio - triaxial accelerometer location 17
Avionics, ARN-83 radio mount - triaxial accelerometer location 18

Photo 8.

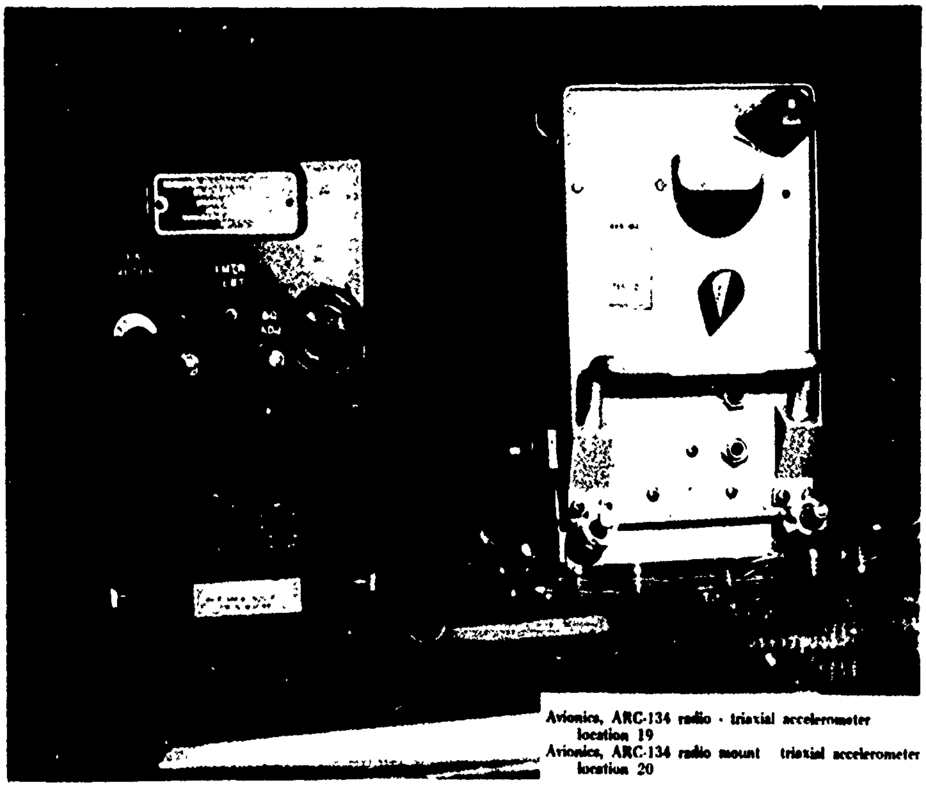
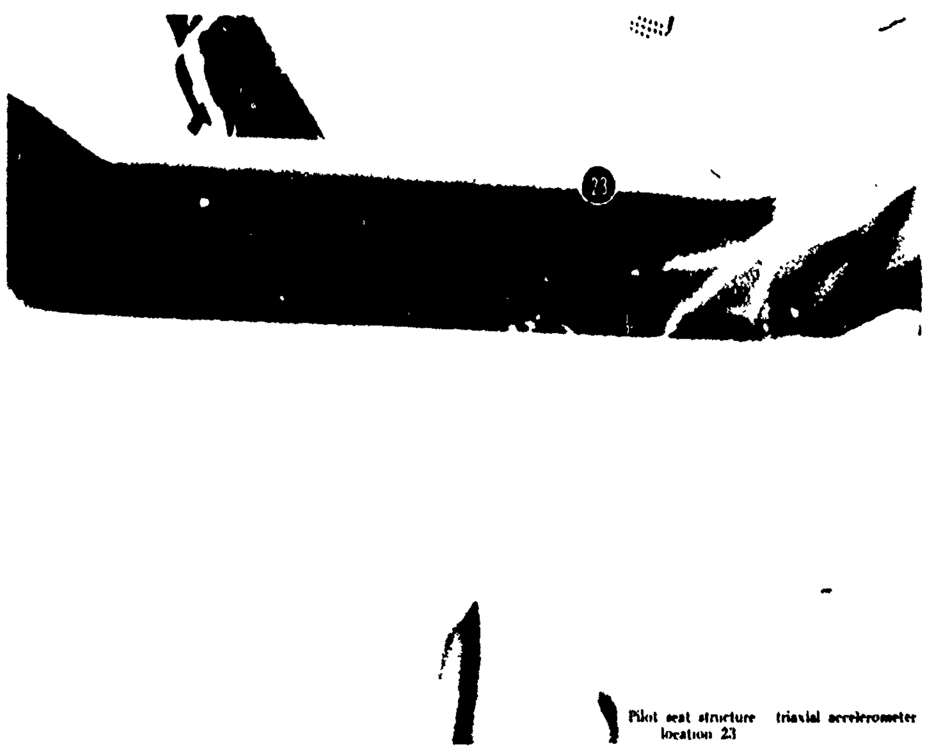


Photo 9.

Photo 10.

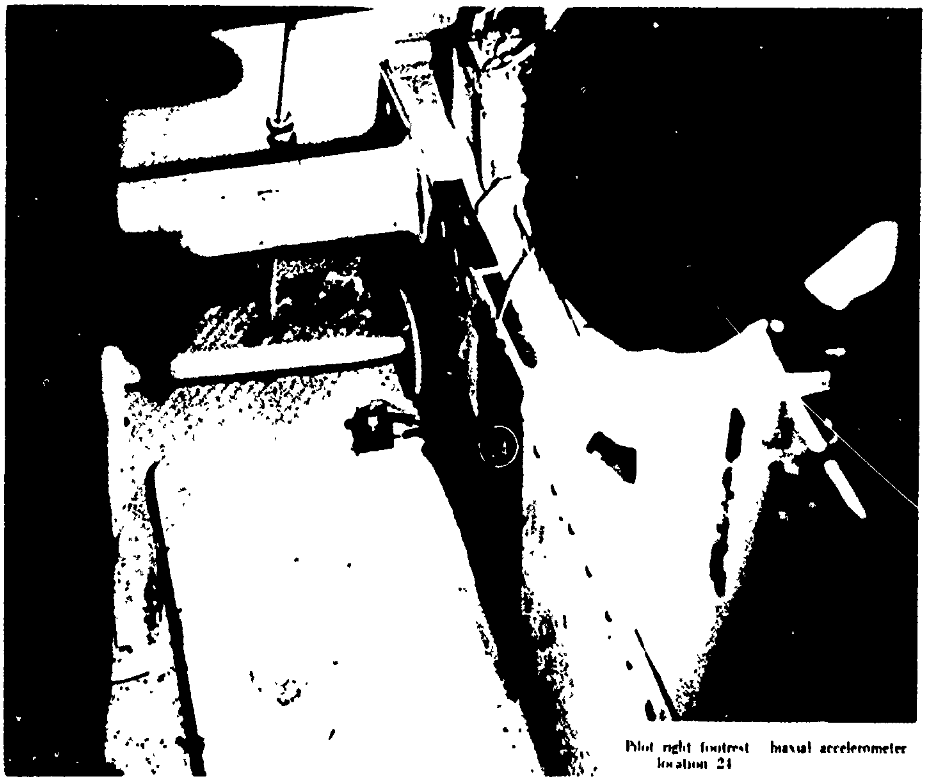
Pilot seat pad plate - triaxial accelerometer location 23

Photo 11.



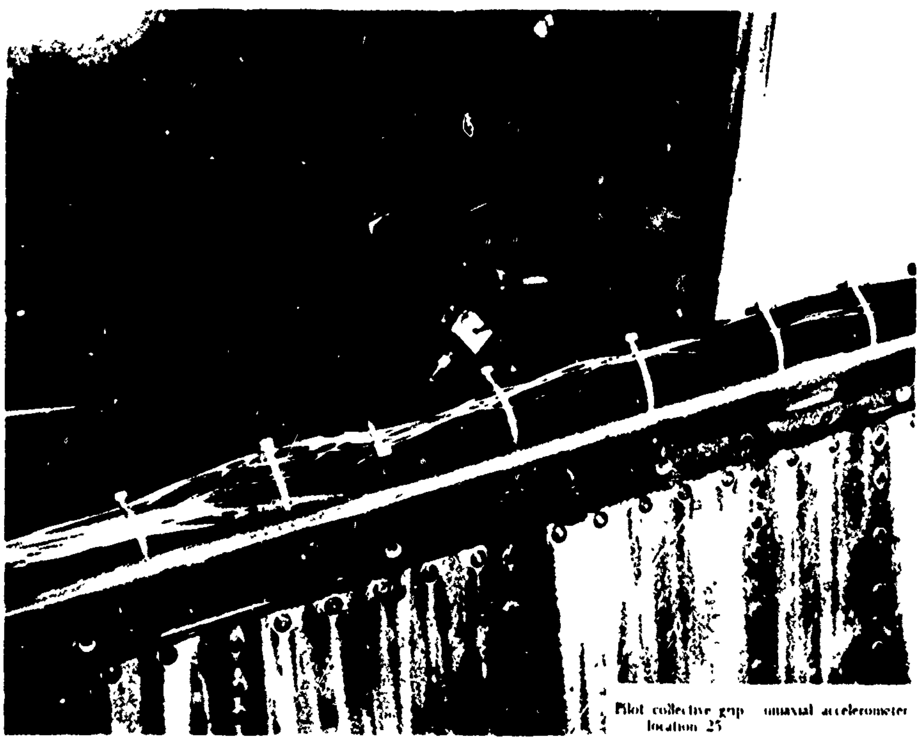
Pilot seat structure triaxial accelerometer location 23

Photo 12.



Pilot right footrest biaxial accelerometer location 24

Photo 13.



Pilot collective grip uniaxial accelerometer location 25

Photo 14.

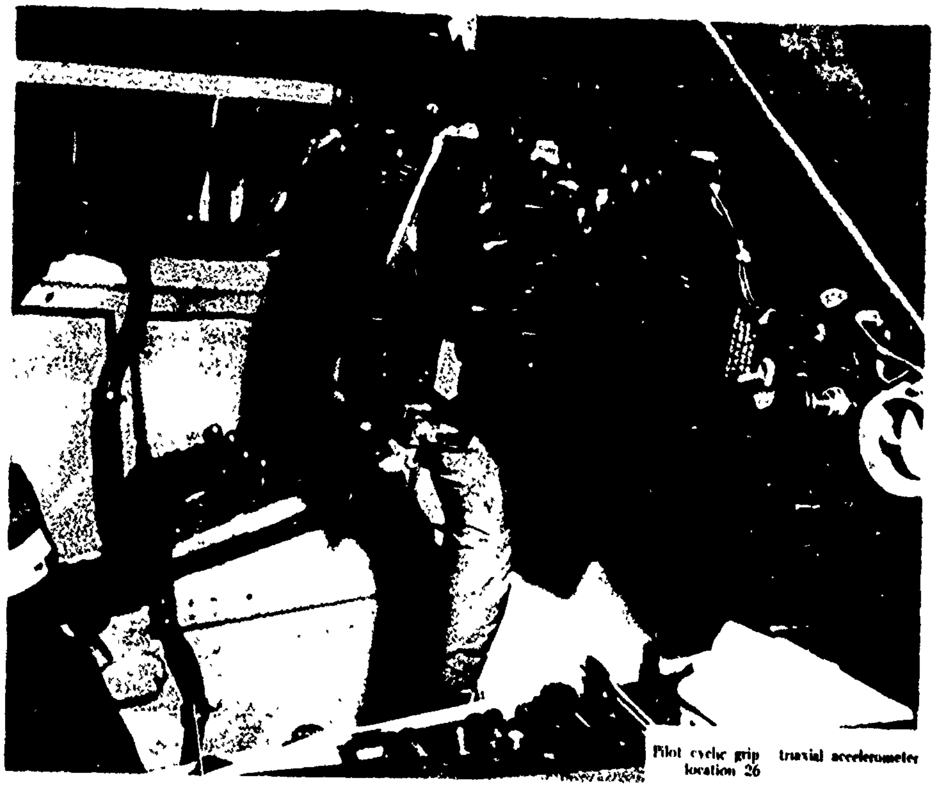


Photo 15.

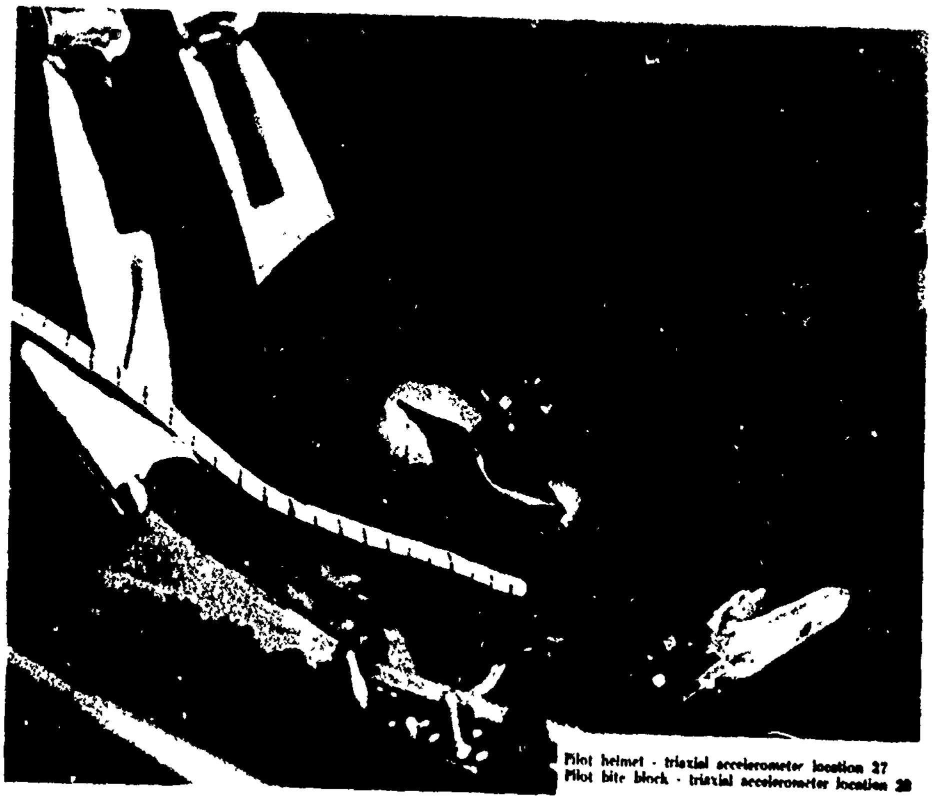


Photo 16.

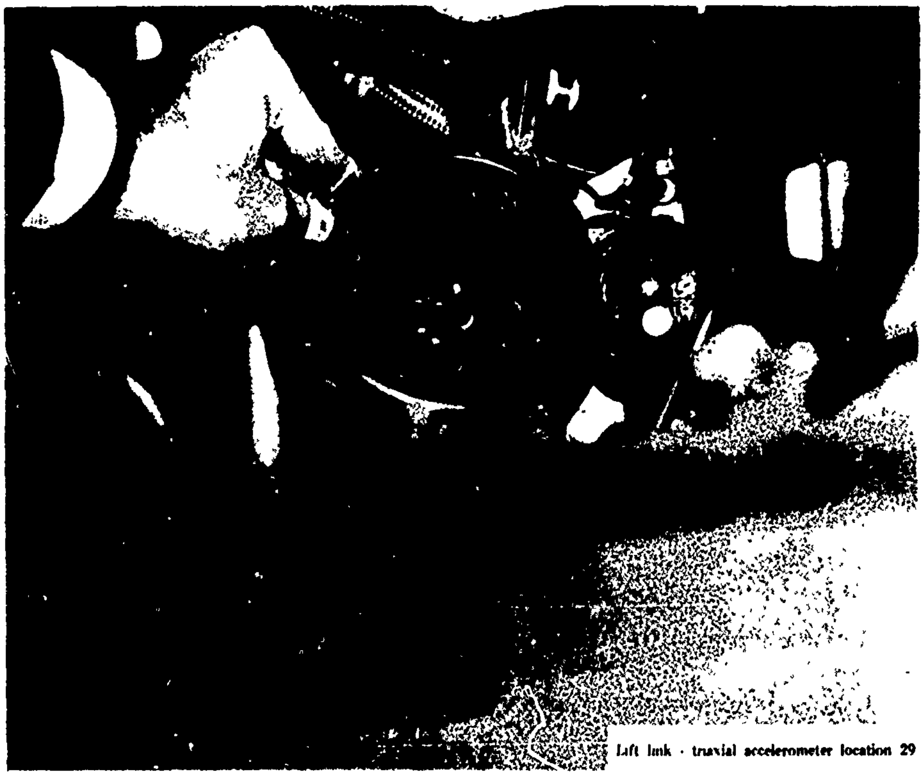


Photo 17.

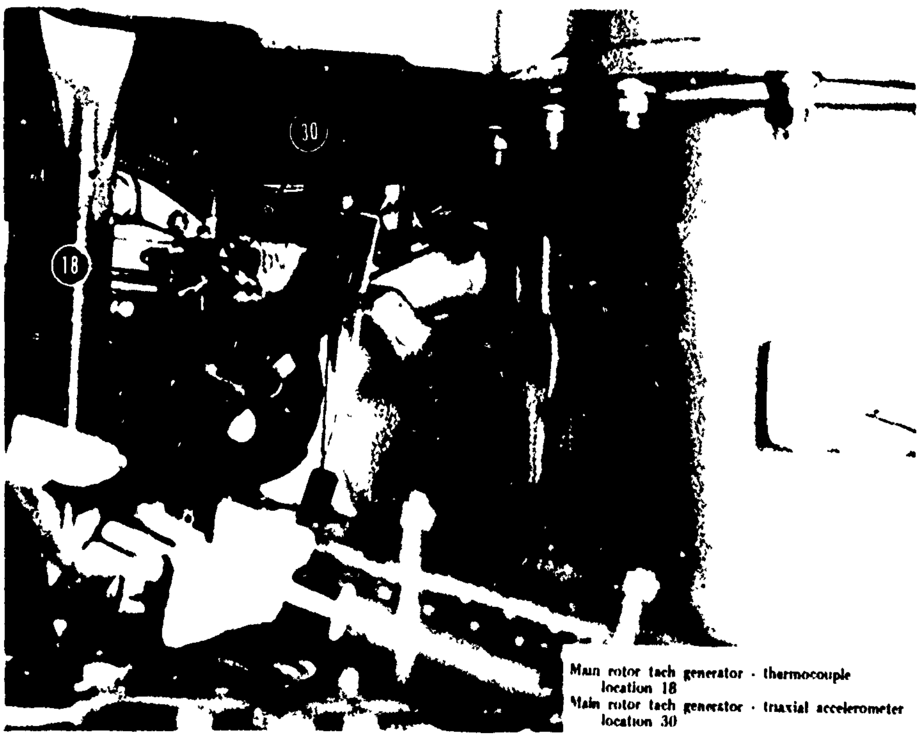


Photo 18.

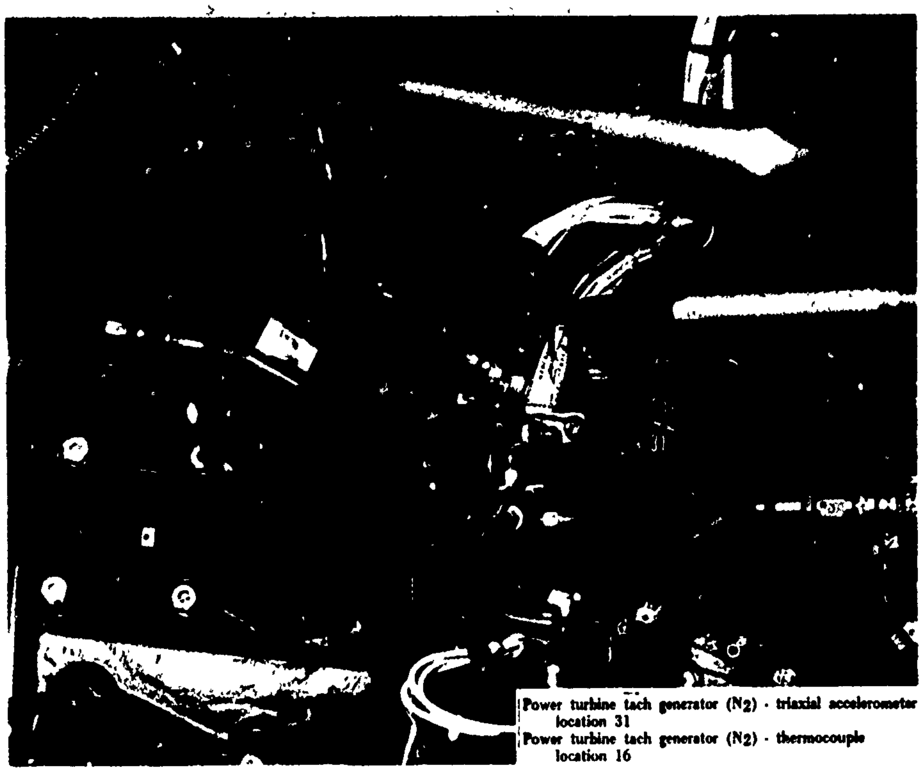


Photo 19.

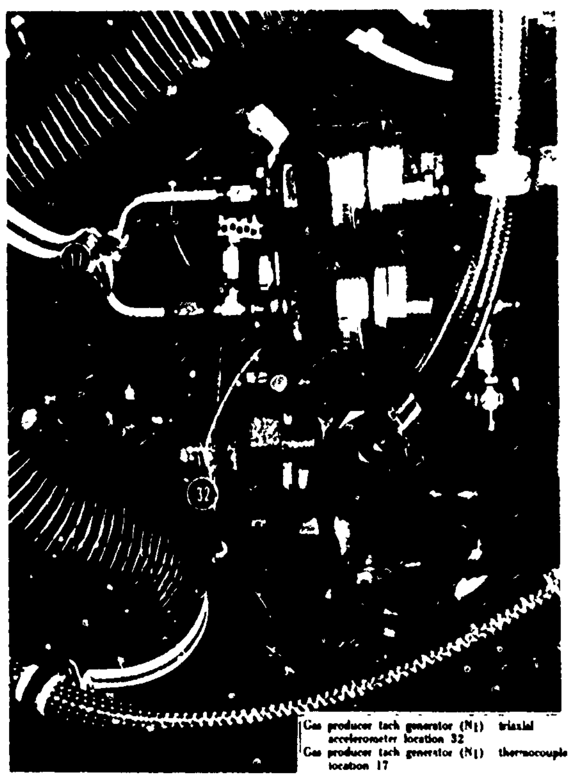
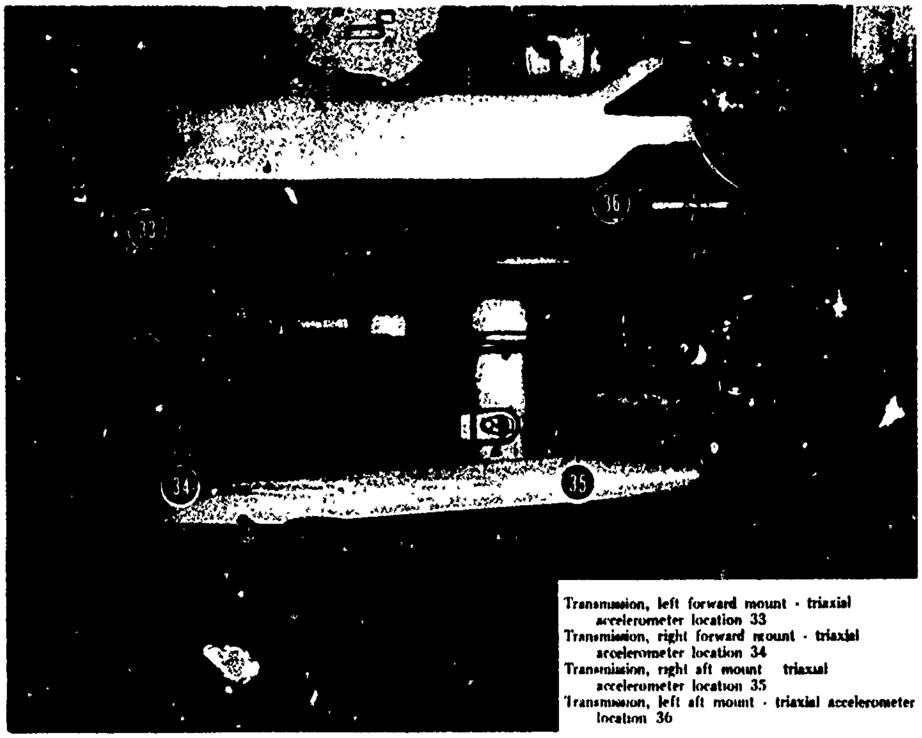
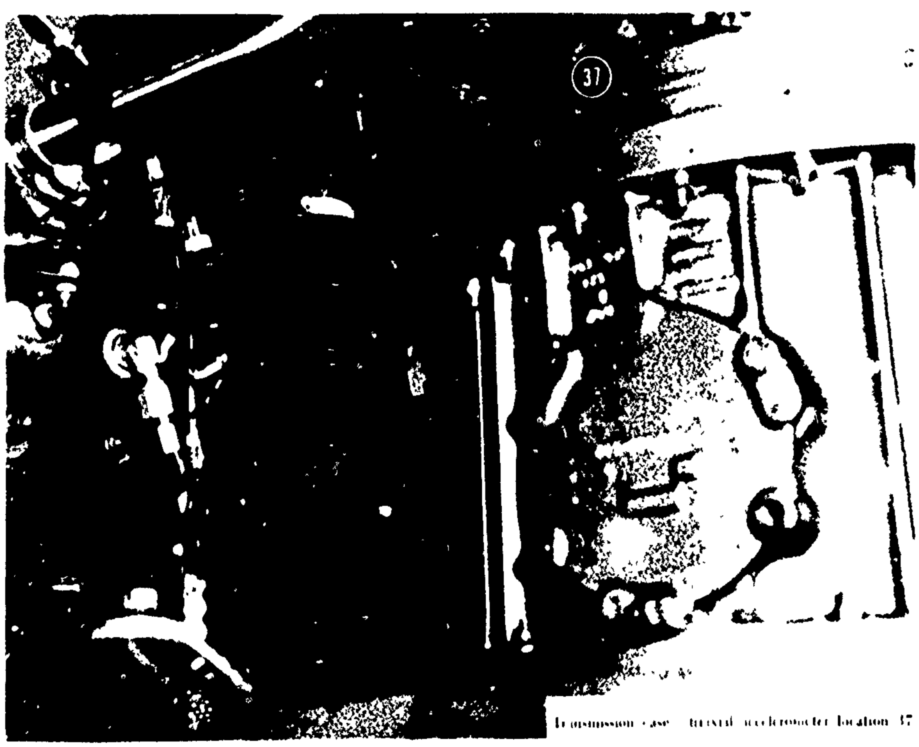


Photo 20.



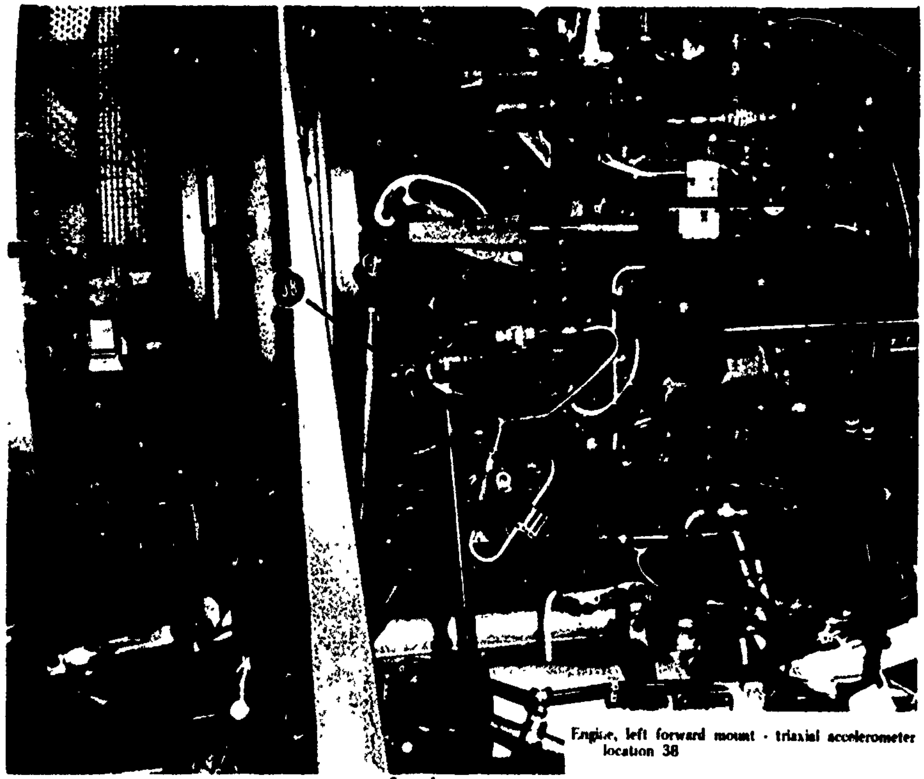
Transmission, left forward mount - triaxial accelerometer location 33
Transmission, right forward mount - triaxial accelerometer location 34
Transmission, right aft mount triaxial accelerometer location 35
Transmission, left aft mount - triaxial accelerometer location 36

Photo 21.



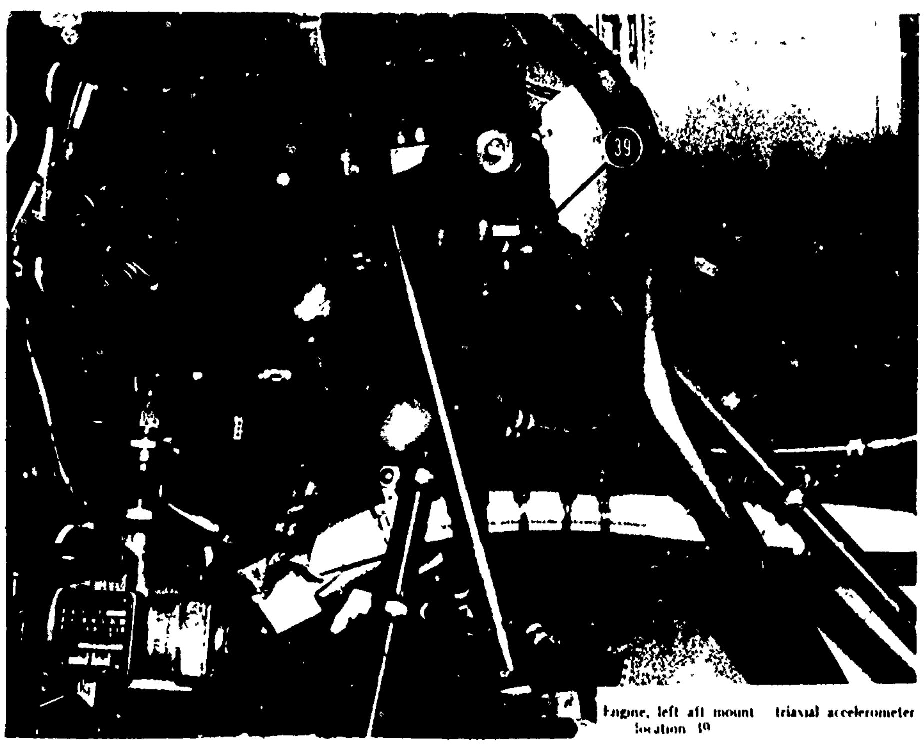
Transmission case triaxial accelerometer location 37

Photo 22.



Engine, left forward mount - triaxial accelerometer location 38

Photo 23.



Engine, left aft mount triaxial accelerometer location 39

Photo 24.

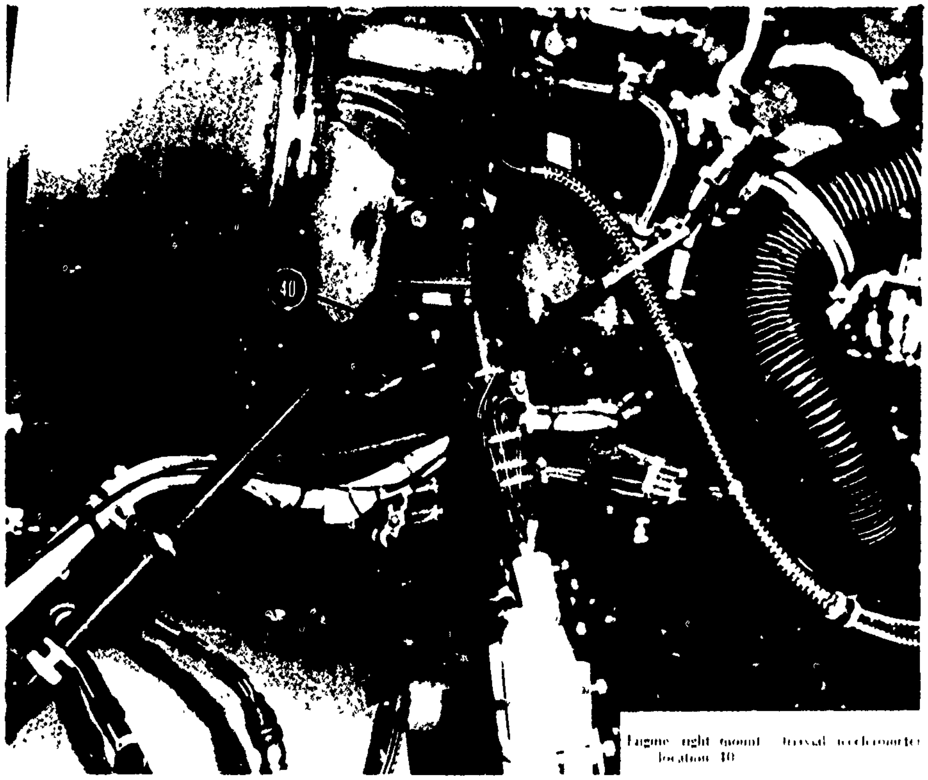


Photo 25.

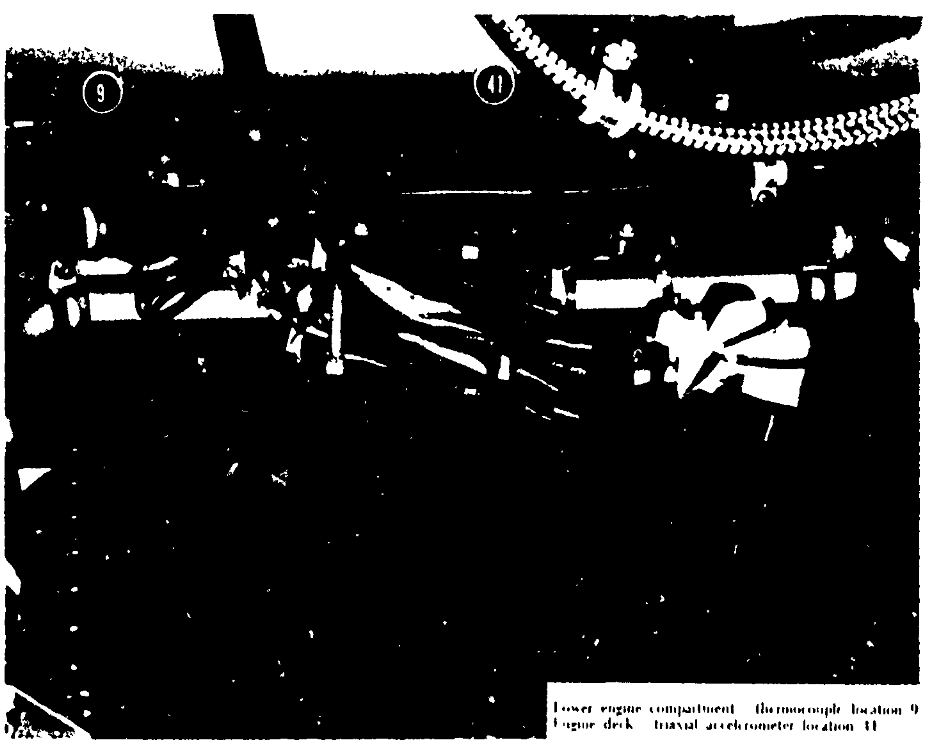


Photo 26.

Photo 27.

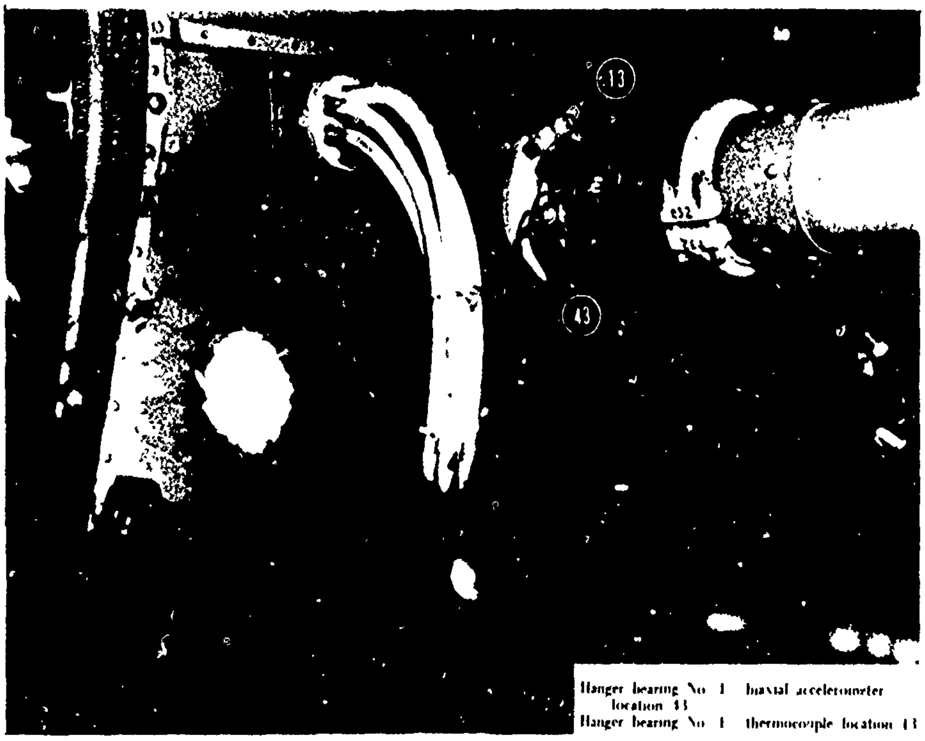


Photo 28.

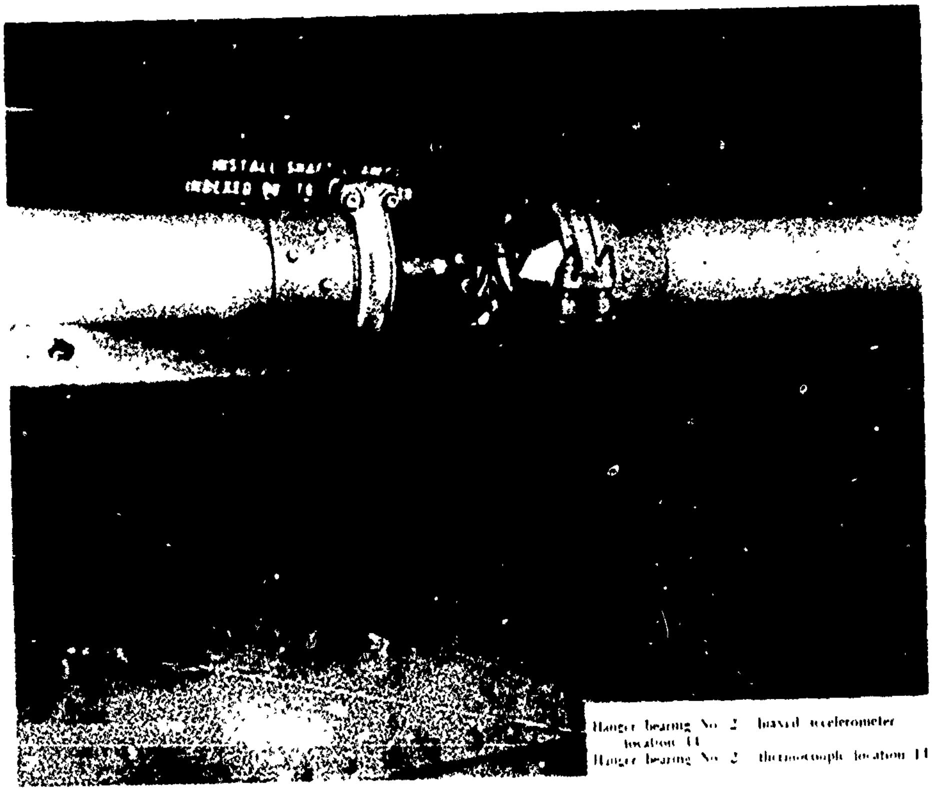


Photo 29.

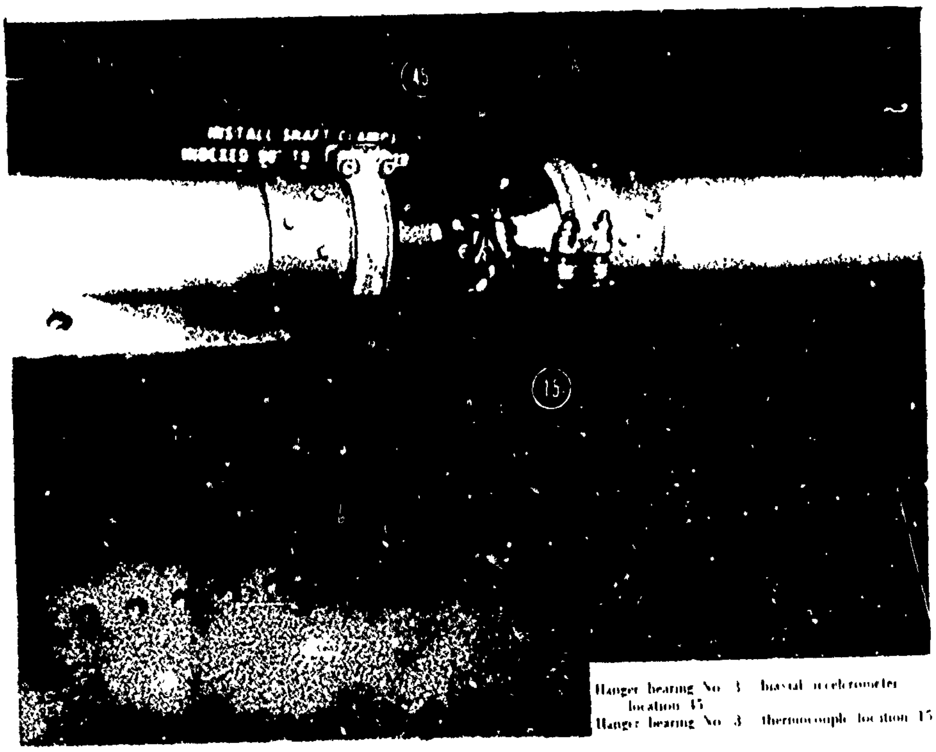


Photo 30.

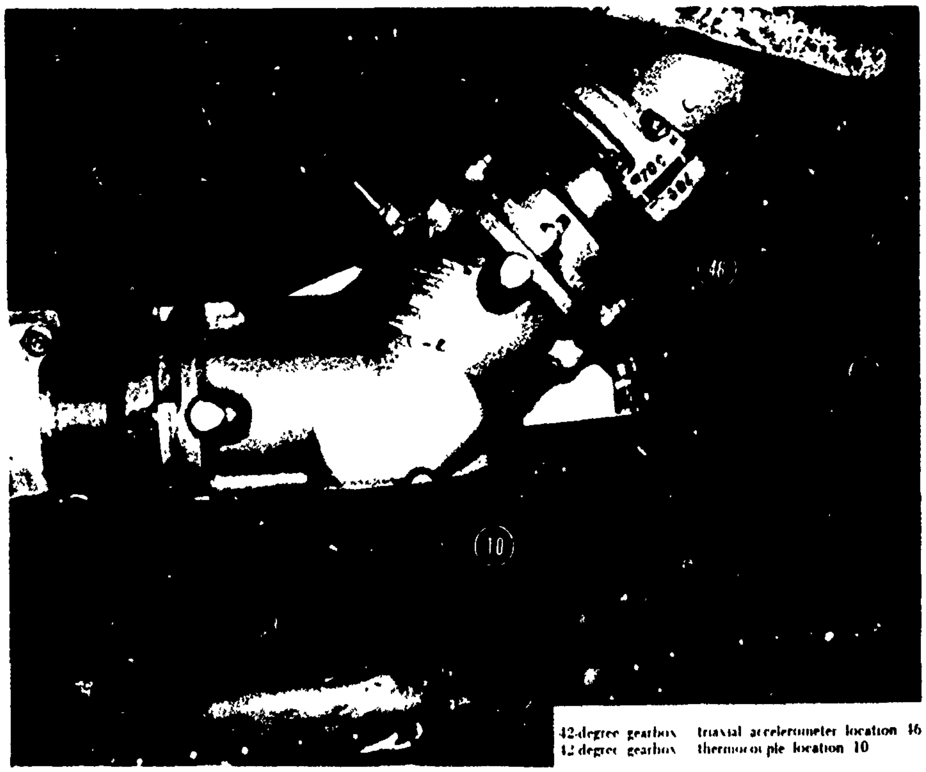
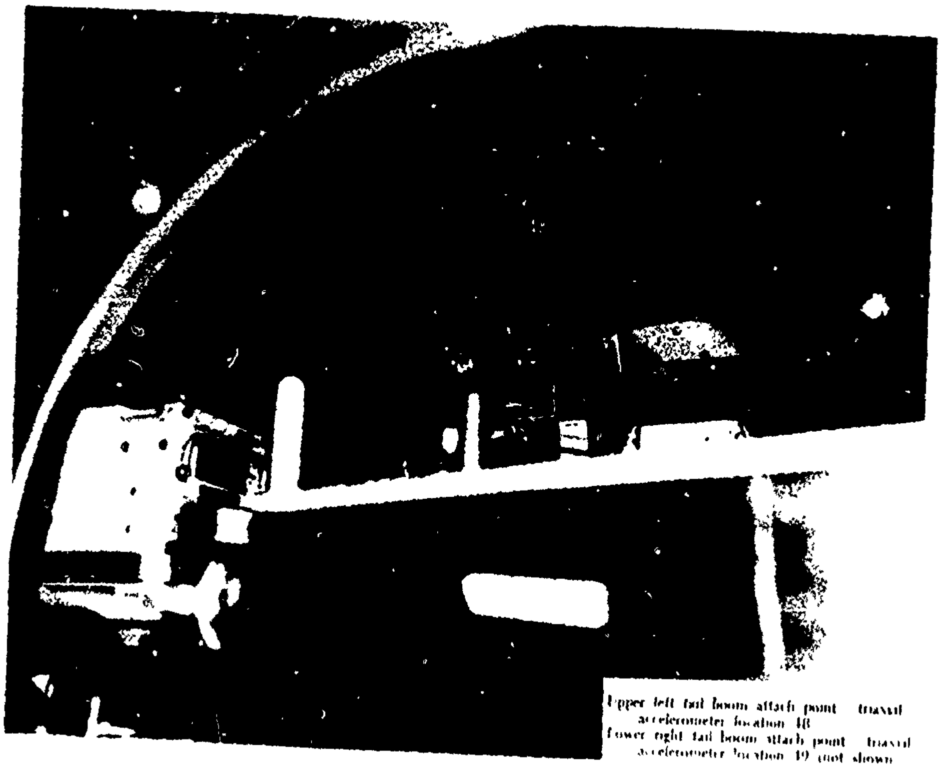


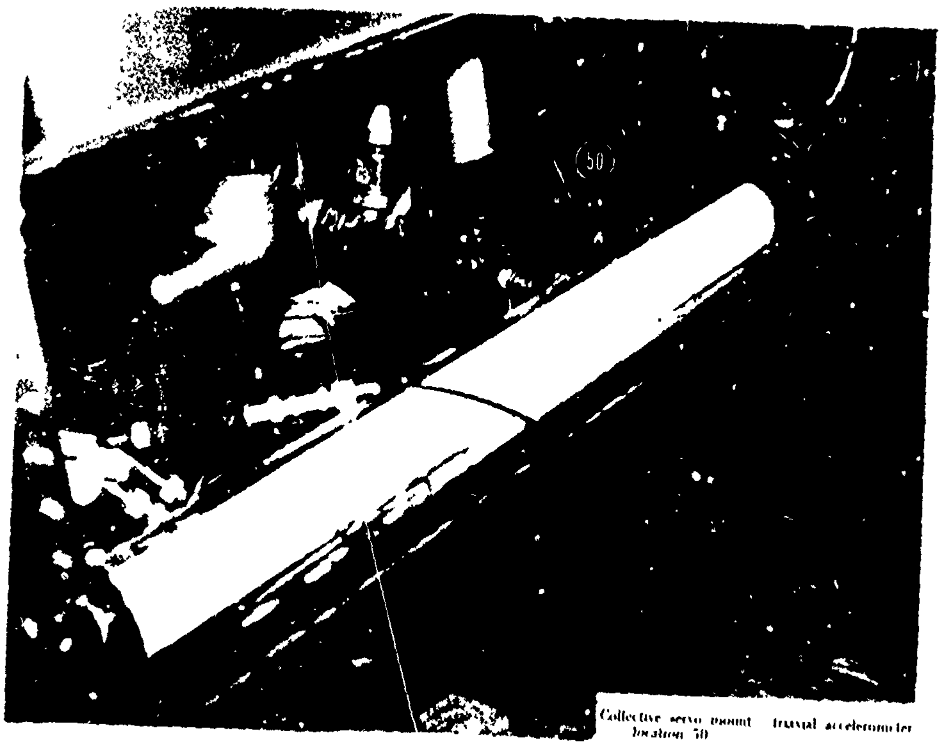
Photo 31.

Photo 32.



Upper left tail boom attach point - triaxial accelerometer location 48
Lower right tail boom attach point - triaxial accelerometer location 49 (not shown)

Photo 33.

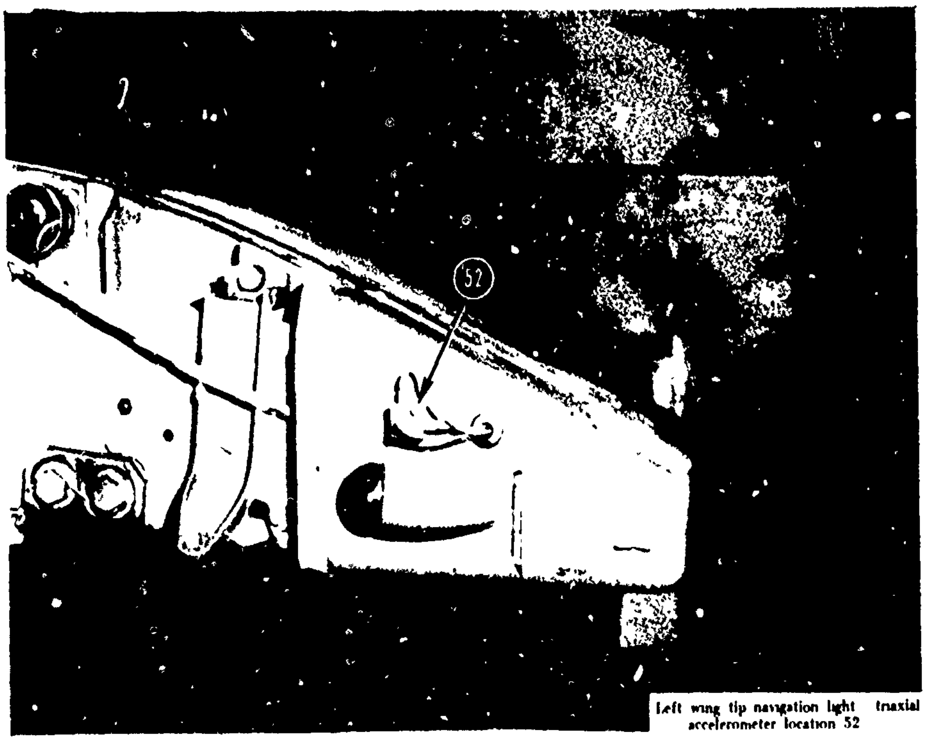


Collective servo mount - triaxial accelerometer location 50

Photo 34.

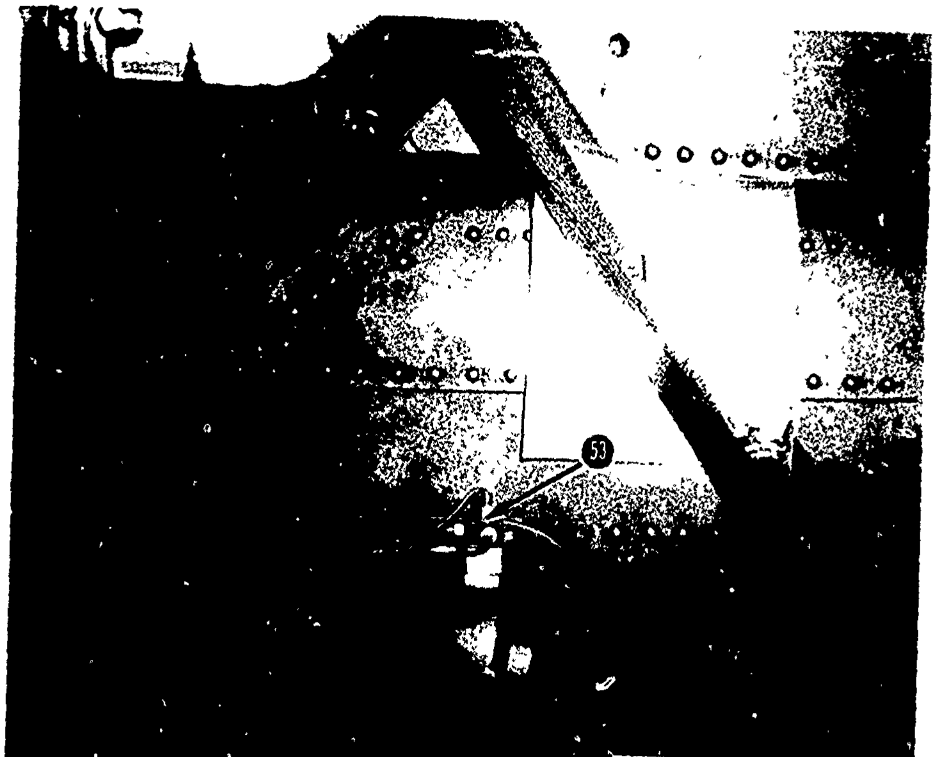
Right elevator tip - triaxial accelerometer location 51

Photo 35.



Left wing tip navigation light triaxial accelerometer location 52

Photo 36.

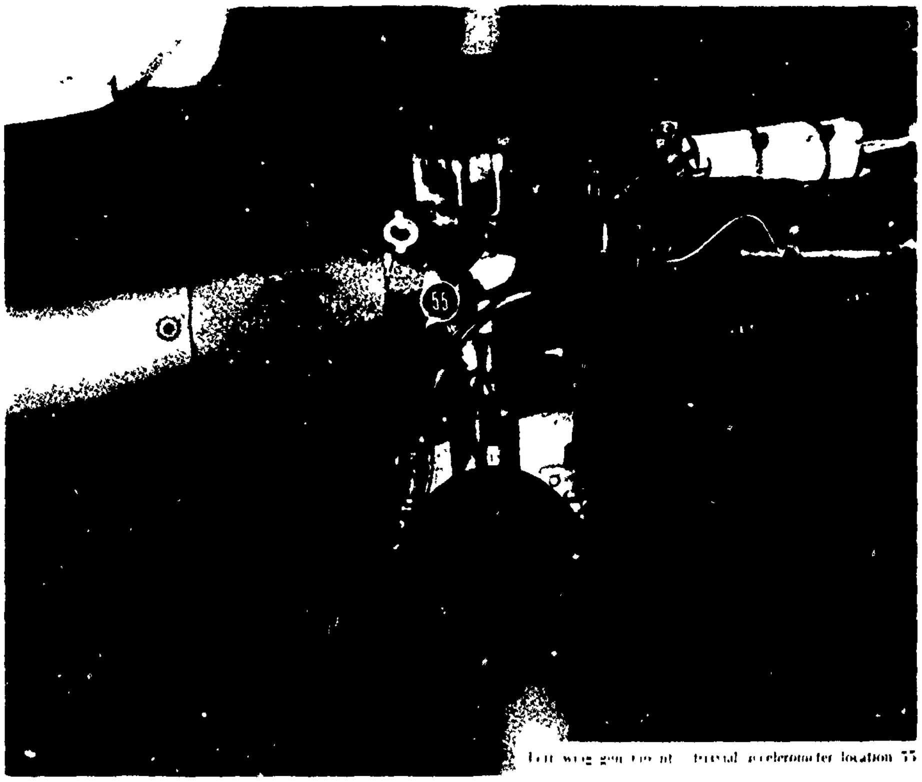


Tail navigation light triaxial accelerometer location 53

Photo 37.

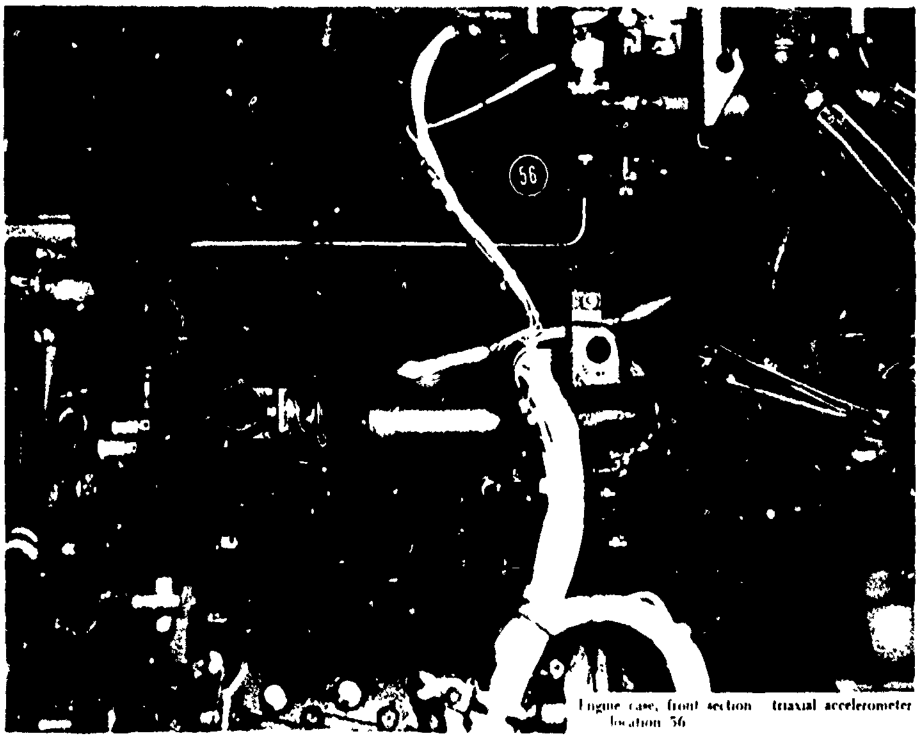
Turret gun mount triaxial accelerometer location 54

Photo 38.



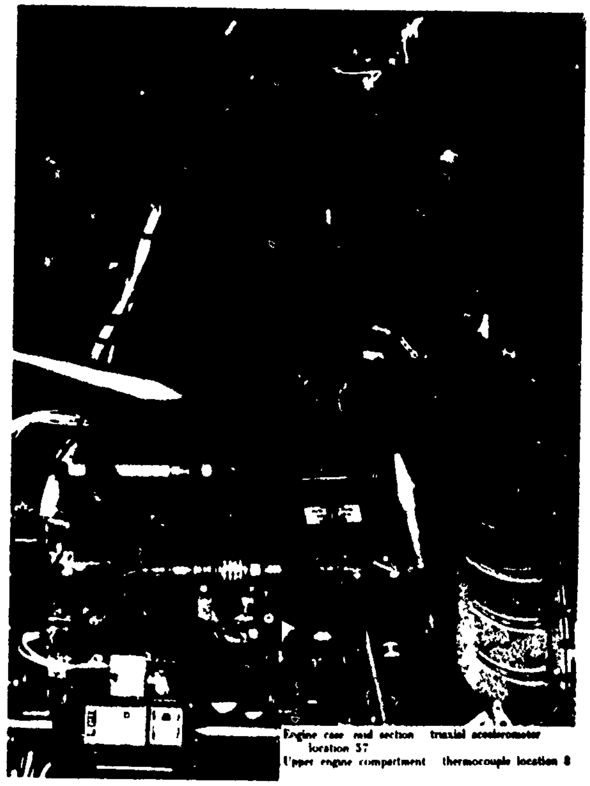
Left wing gun mount – triaxial accelerometer location 55

Photo 39.



Engine case, front section – triaxial accelerometer location 56

Photo 40.

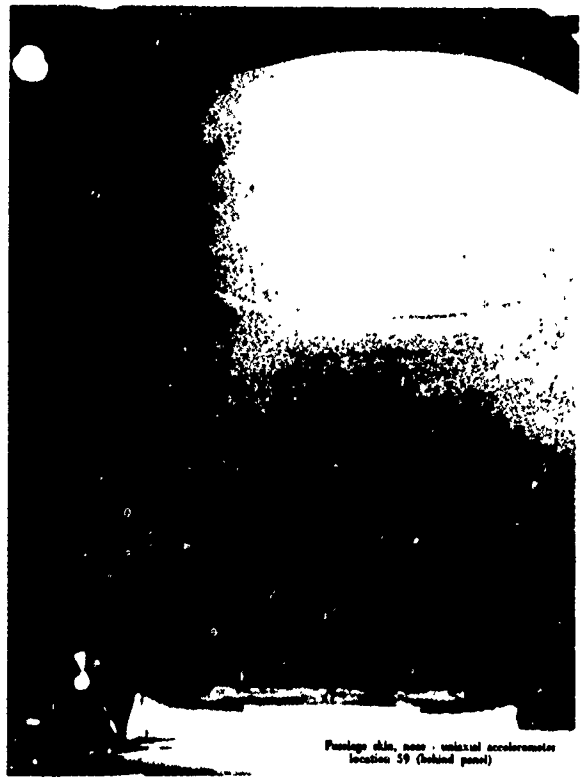


Engine case mid section triaxial accelerometer location 57
Upper engine compartment thermocouple location 8

Photo 41.

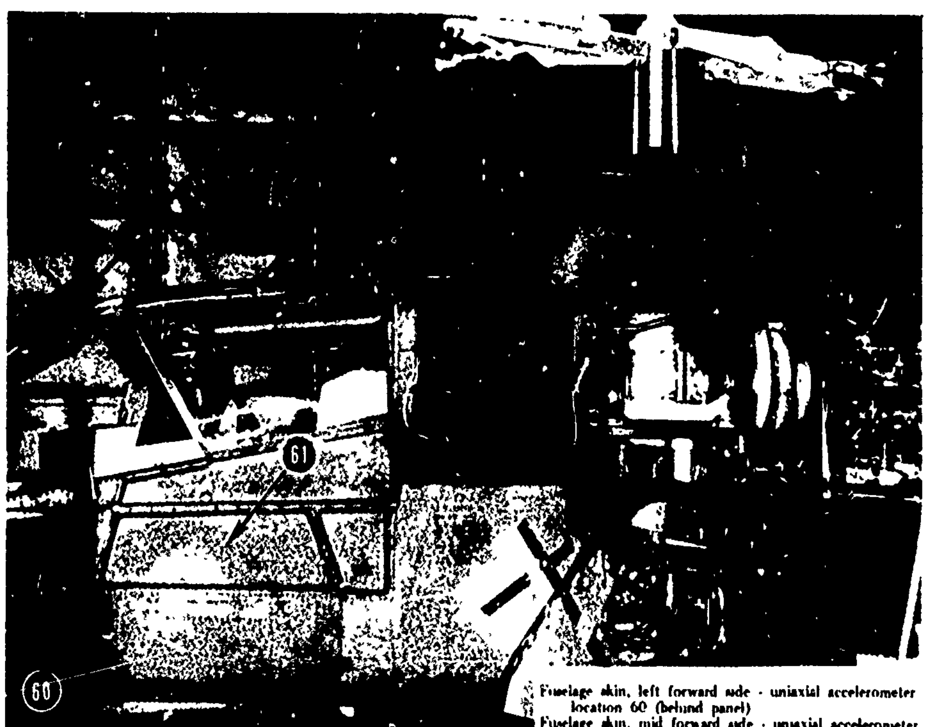
Engine case, aft triaxial accelerometer location 58

Photo 42.



Fuselage skin, nose - uniaxial accelerometer location 59 (behind panel)

Photo 43.



Fuselage skin, left forward side - uniaxial accelerometer location 60 (behind panel)
Fuselage skin, mid forward side - uniaxial accelerometer location 61 (behind panel)

Photo 44.

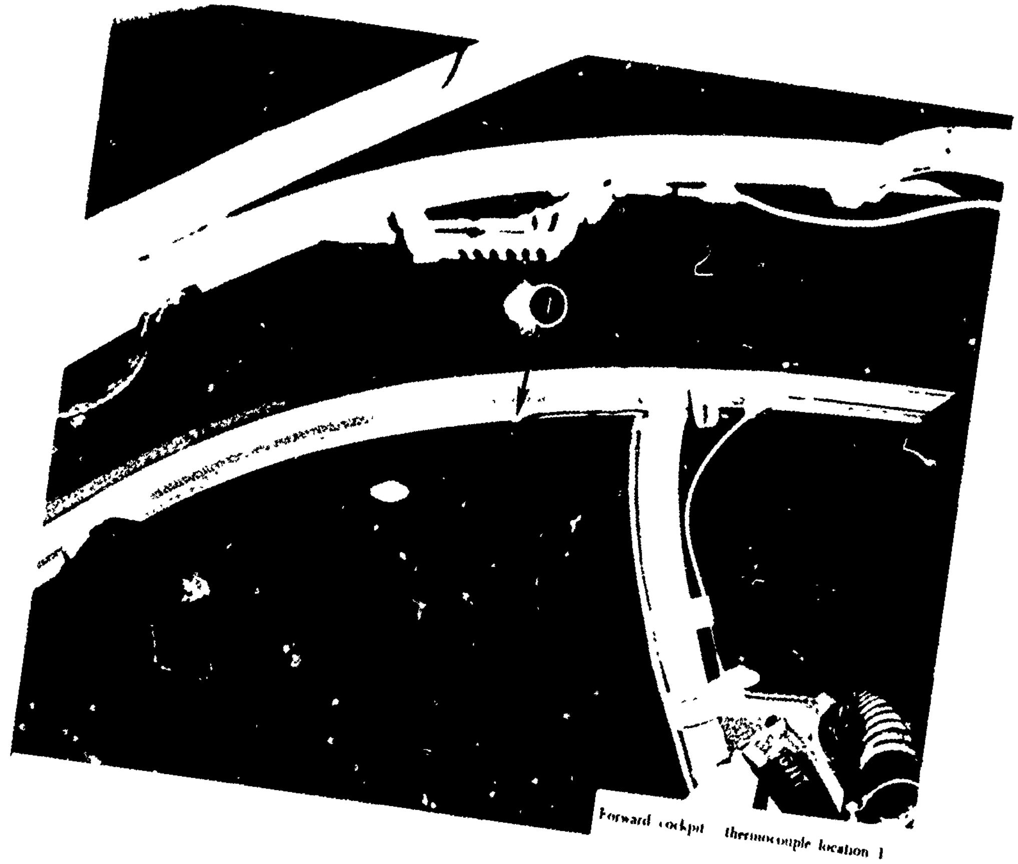


Photo 45.

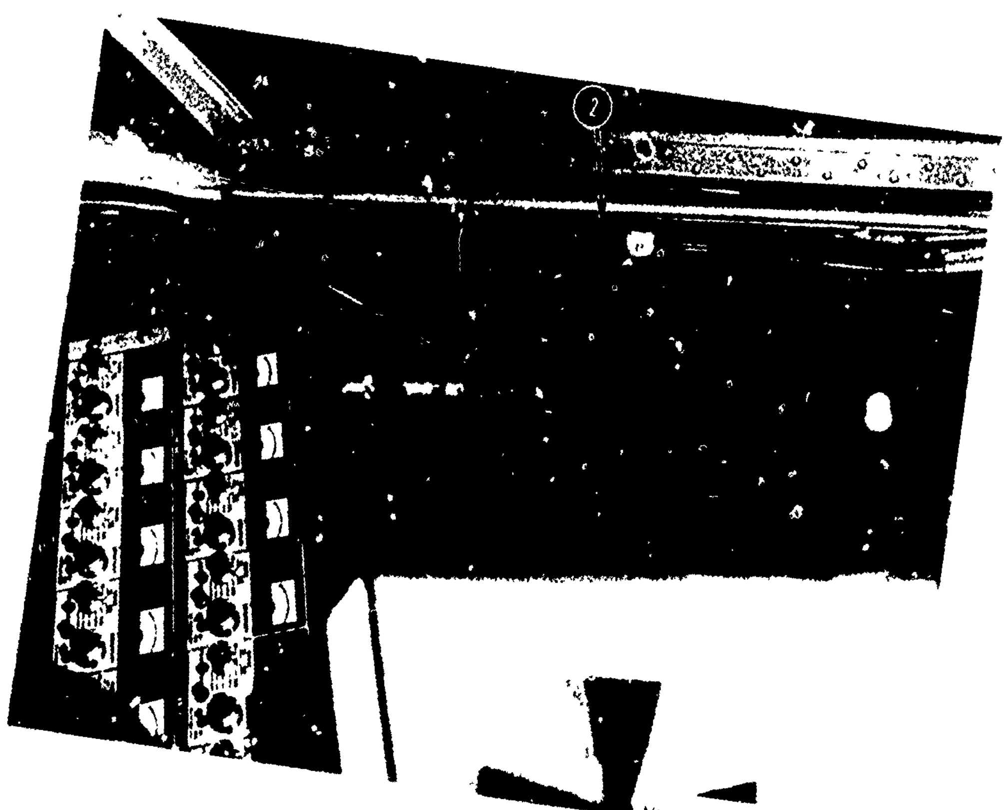
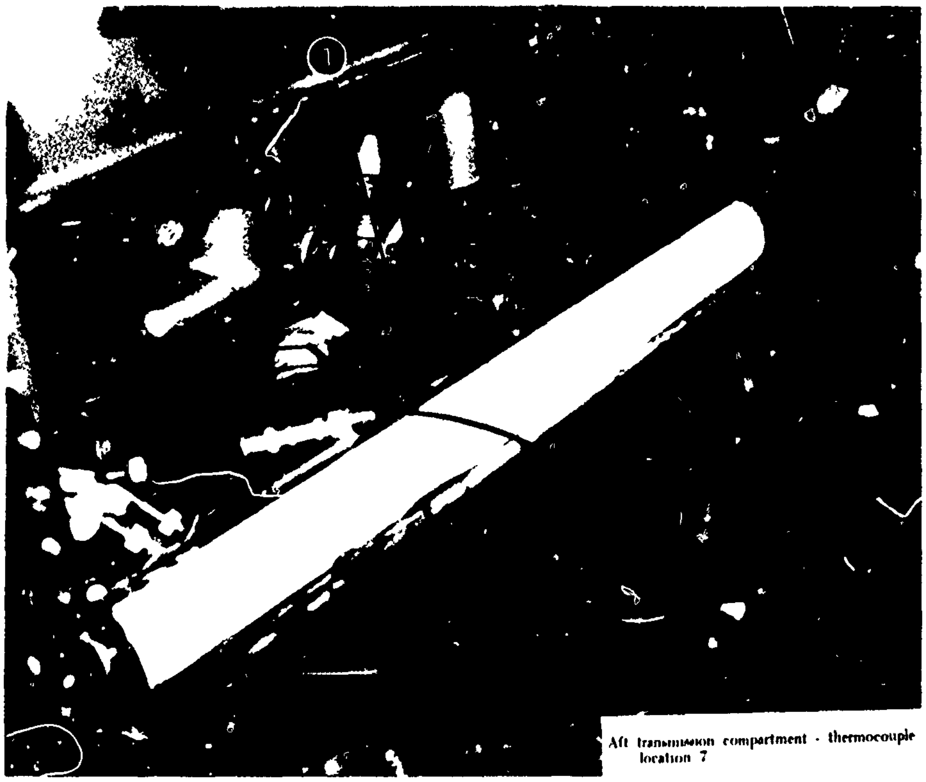
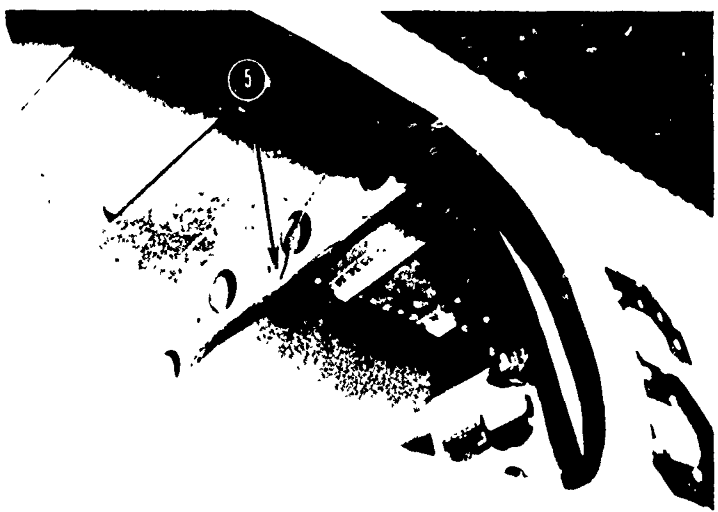


Photo 46.



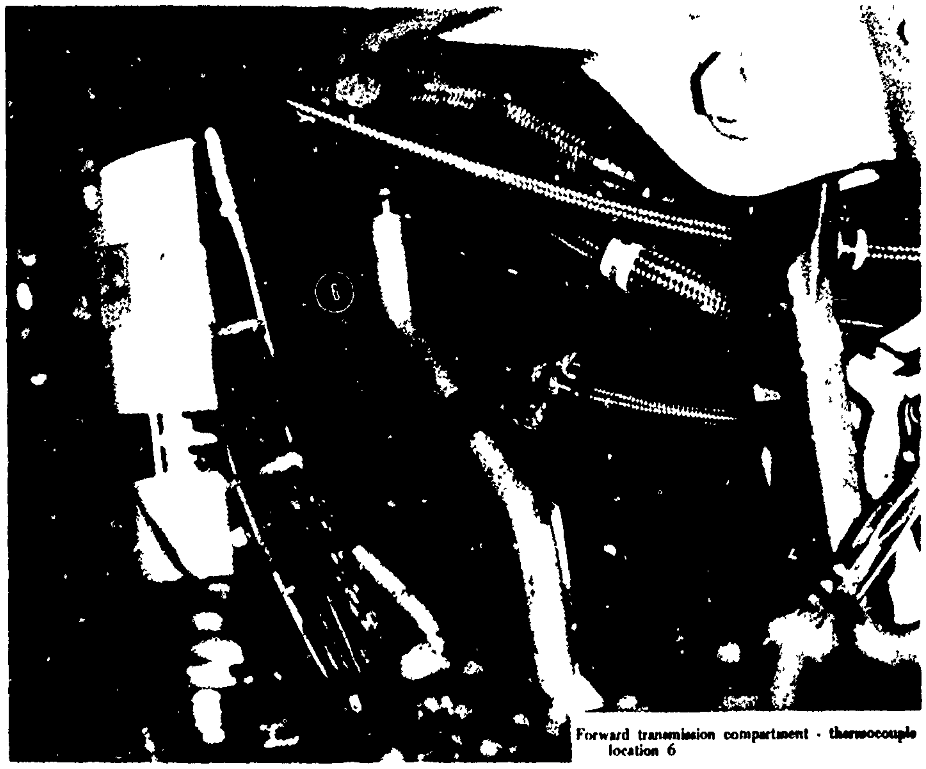
Aft transmission compartment - thermocouple location 7

Photo 47.



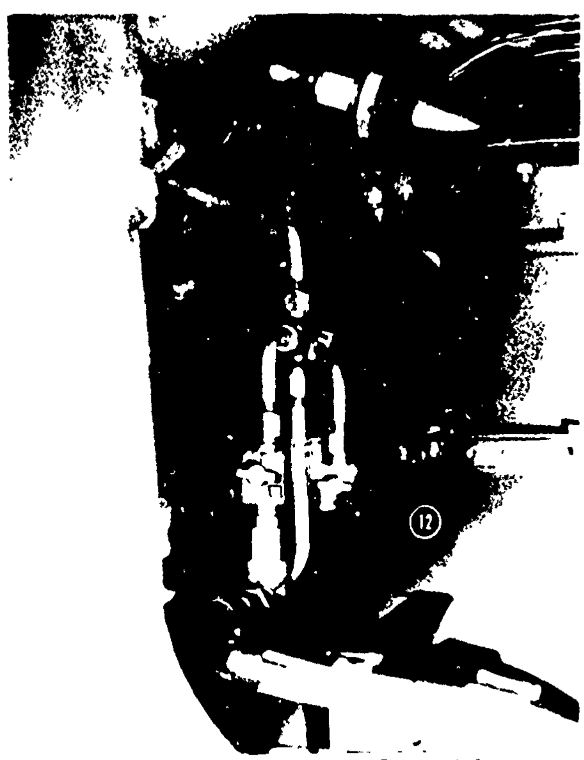
avionics thermocouple location 5

Photo 48.



Forward transmission compartment - thermocouple location 6

Photo 49.



Oil Cooler Area Thermocouple Location 12

Photo 50.

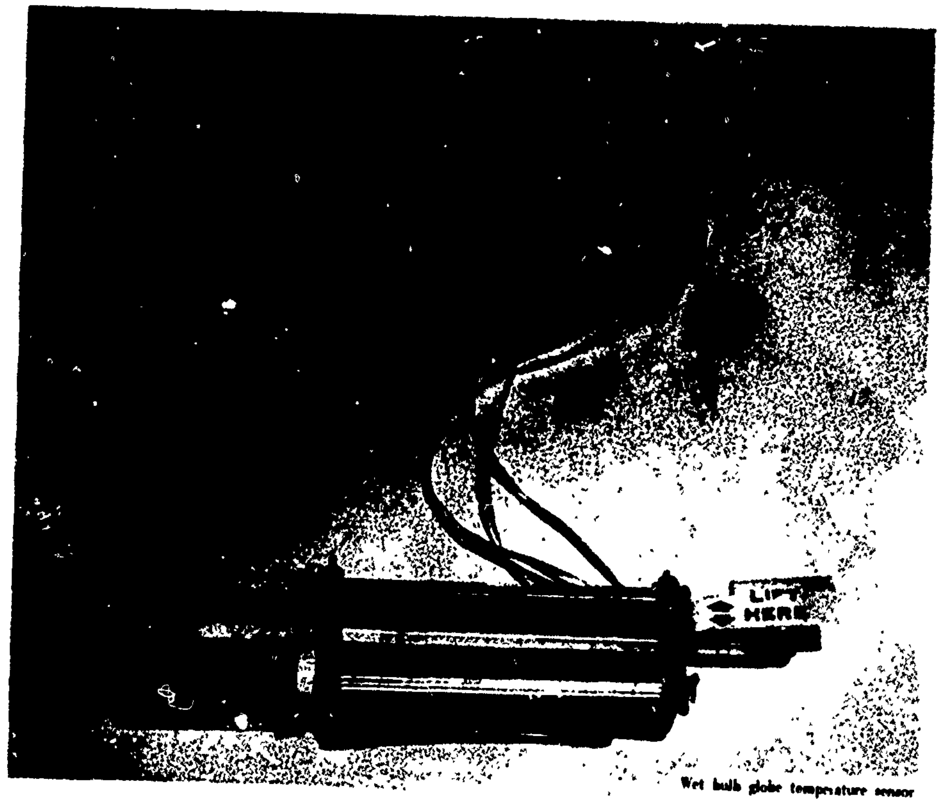


Photo 51.

APPENDIX D. TEST AND DATA ANALYSIS METHODS

1 Because of the discrete frequency content of the data, a narrow-band spectral analysis was performed. A Spectral Dynamics 301 real-time spectral analyzer was utilized to perform the spectral analysis. This spectral analysis converted the data from the time domain (acceleration as a function of time) to the frequency domain (acceleration as a function of frequency). The output of the spectral analysis was a digital plot of acceleration versus frequency composed of acceleration values at 500 discrete frequencies uniformly spaced over the selected frequency range of the spectrum analyzer. The data were analyzed over two frequency ranges. zero to 500 Hz for instruments, avionics, and the pilot station, and zero to 2000 Hz for all other locations with resolution bandwidths of 1 Hz and 4 Hz, respectively. The zero-to-500-Hz analysis range was utilized for all instruments, avionics, and pilot station data, since there were no data of interest above 500 Hz, and the frequency resolution was better on the 500-Hz range than on the 2000-Hz range. The zero-to-2000-Hz analysis range was used for all other locations, since there were significant data above 500 Hz and the maximum instrumentation frequency response was 2000 Hz. Because of the random variation in amplitude, the data were averaged over a period of time to determine the mean acceleration amplitude for each test condition. This data averaging was accomplished with a Spectral Dynamics 302B ensemble averager. Data were averaged over an 8-second time interval for steady-state nonweapons-firing flight conditions, a 2-second interval for maneuvering flight, and a 2-second interval for weapons firing. The 2-second maneuvering flight analysis time interval was selected to cover the most severe vibrations encountered during the maneuver.

2 The following equations were used to calculate the acceleration mean and standard deviation values:

a Mean ($\bar{X}$)

$$\bar{X} = \frac{\sum_{j=1}^{N} X_j}{N}$$

b Standard deviation (S)

$$S = \sqrt{\frac{\sum_{j=1}^{N} \left(X_j - \bar{X}\right)^2}{N}}$$

c. Mean plus standard deviation (Y):

$$Y = \overline{X} + S$$

Where: X_j = acceleration at a specific frequency

N = number of records compressed

3. Figures 1 and 2 are block diagrams of the spectral analysis and data compression procedures.

TEMPERATURE DATA

4. The electrical analogue shown in figure 3 was developed to predict the temperature of the cabin and avionics under static conditions at values of ambient air temperature and external radiation different than those tested. The results of this analysis are presented in figures 254 through 262, appendix E.

FIGURE 1
PROJECT 70-15 VIBRATION DATA
SPECTRAL ANALYSIS PROCEDURE

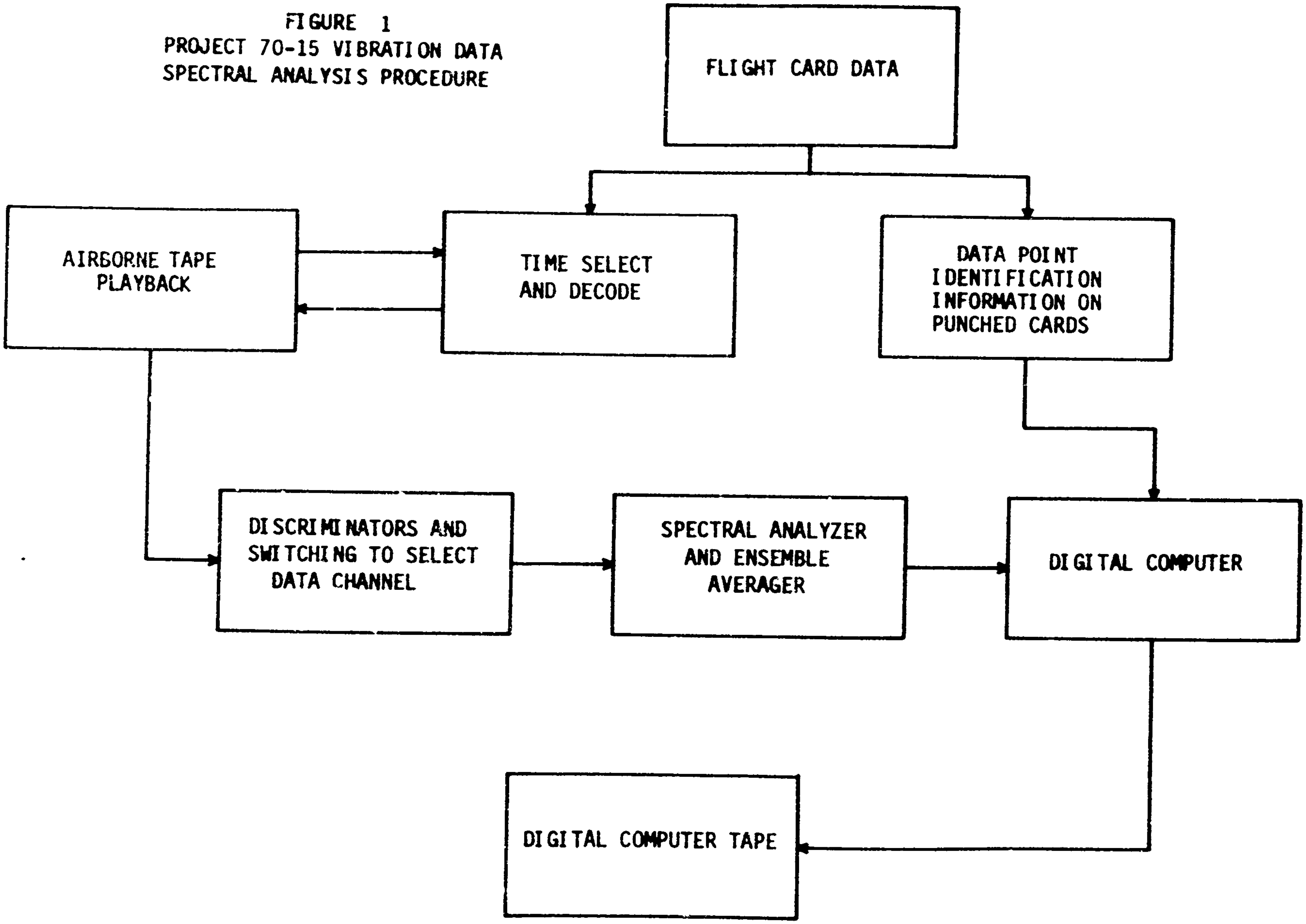
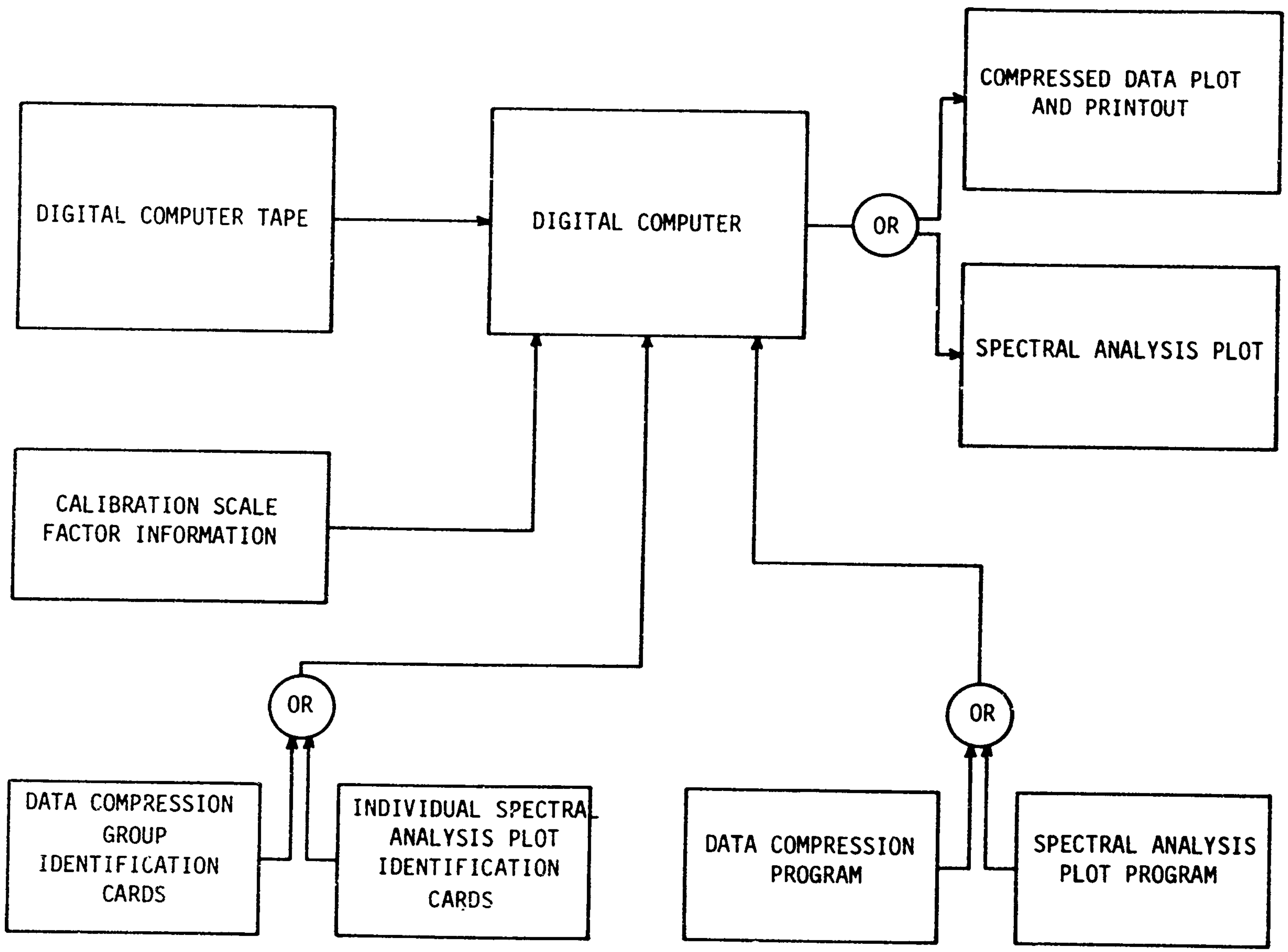


FIGURE 2
PROJECT 70-15 VIBRATION DATA
COMPRESSION PROCEDURE



ELECTRICAL QUANTITY	HEAT TRANSFER QUANTITY	UNIT (°K)
V ~ Voltage	T_a ~ Ambient air temperature	°K
V_c ~ Voltage across capacitor	T_c ~ Transient temperature inside helicopter	°K
	T_{ss} ~ Steady-state temperature inside helicopter	°K
	T_o ~ Initial temperature inside helicopter	°K
R_1 ~ Resistance	K_c ~ Conduction coefficient	Hr · °K/BTU
R_1 ~Resistance	K_r ~ Radiation heat transfer coefficient	Hr · °K/BTU
C ~ Capacitor	C ~ Heat capacity	BTU/°C
I ~ Current	E_{ex} ~ Total external radiation	BTU/hr
	E_a ~ Atmospheric radiation (total external radiation minus solar radiation)	BTU/hr
	E_s ~ Solar radiation	BTU/hr
t ~ Time	t ~ Time	Hr

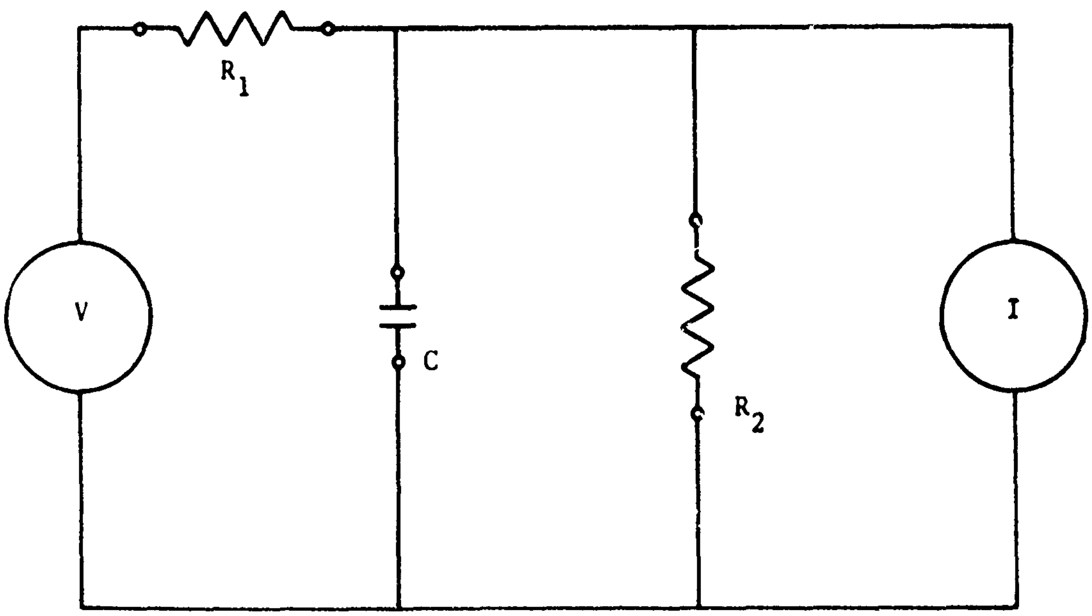


Figure 3. Heat Transfer Electrical Analog.

5. Using the circuit shown in figure 3, the equation describing the transient response of the helicopter to an ambient air temperature and source of external radiation can be written as:

$$T_c = e^{-t/K_{eq}C}\left[T_o - \frac{T_a K_r + E_{ex} K_c K_r}{K_c + K_r}\right] + \frac{T_a K_r + E_{ex} K_c K_r}{K_c + K_r} \qquad (1)$$

Where: $K_{eq} = \dfrac{K_c \; K_r}{K_c + K_r}$

When t (time) $\rightarrow \infty$ the steady-state helicopter temperature T_{ss} is given by:

$$T_{ss} = \frac{T_a K_r + E_{ex} K_c K_r}{K_c + K_r} \qquad (2)$$

Where $E_{ex} = E_s + \sigma \, T_a^4$

$\sigma = 1.8 \times 10^{-8}$ BTU/ft^2-hour - °K^4

6. Equation 2 was used to find K_c and K_r by allowing the helicopter to reach its steady-state temperat: at two different constant ambient air temperatures (T_{a1} and T_{a2}) and at two different external radiation values (E_{ex1} and E_{ex2}). This resulted in two equations with two unknowns, K_c and K_r, which were solved for K_c and K_r, equations 3 and 4.

$$K_c = \frac{T_{a_2} \, T_{ss_1} - T_{a_1} \, T_{ss_2}}{E_{ex_1} \, T_{ss_2} - E_{ex_2} \, T_{ss_1}} \qquad (3)$$

$$K_r = -\frac{T_{ss_1} \; K_c}{T_{a_1} + E_{ex_1} \, K_c - T_{ss_1}} \qquad (4)$$

7. A different K_c and K_r were calculated for each temperature sensor location. Each location was considered to comprise an area of 1 square foot which enabled the measured external radiation value in units of BTU/ft^2-hr to be converted to BTU/hr. These values of K_c and K_r were then inserted into equation 2 in order to calculate the steady-state temperatur : each temperature sensor location for different values of solar radiation and ambient air temperature than those tested (figs. 136 through 144, app G).

WET BULB GLOBE TEMPERATURE CALCULATION

8. The WBGT index is calculated from the following equation:

$$WBGT = 0.7WB + 0.2GT + 0.1DB$$

Where: WB = Naturally convected wet bulb temperature - °F

DB = Dry bulb temperature - °F

GT = Globe temperature - °F

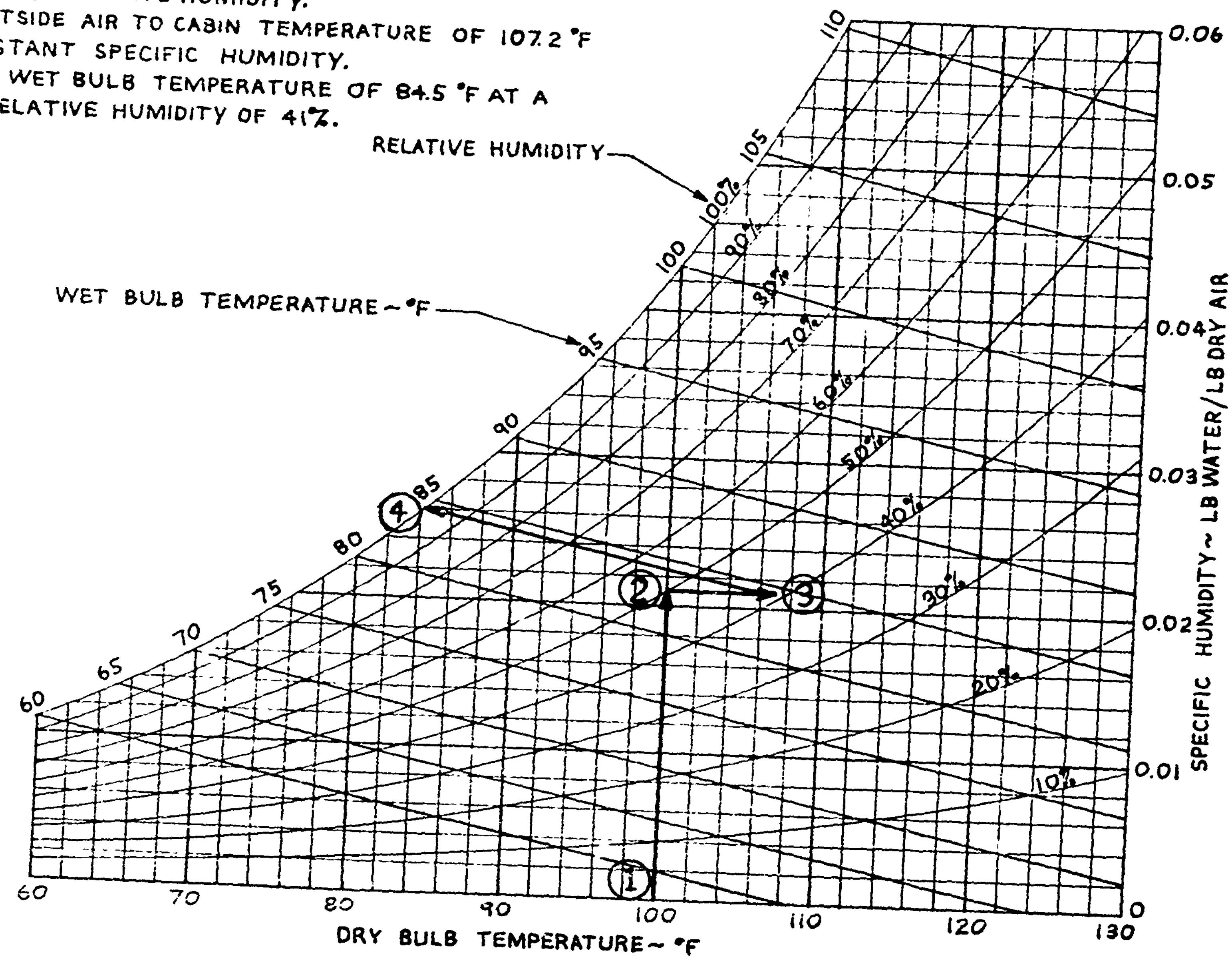
For an outside air temperature of 100°F, a solar radiation value of 250 BTU/hr-ft^2 and an airspeed of 80 KCAS, a cabin temperature rise of 12.8°F and a globe temperature rise of 17.0°F can be determined from the left side of figure G. The cabin temperature rise is added to the outside air temperature of 100°F to give a cabin temperature of 112.8°F. The globe temperature rise of 17.0°F is added to the cabin temperature to give a globe temperature of 129.8°F. At a relative humidity of 50 percent at 100°F, a psychrometric chart (shown on the next page) can be used to determine a wet bulb temperature of 86.0°F for a cabin dry bulb temperature of 112.8°F. Using these temperature values, the WBGT can be calculated.

$$WBGT = (0.7)\ (86.0) + (0.2)\ (129.8) + (0.1)\ (112.8) = 97.4°F$$

PSYCHROMETRIC CHART

BAROMETRIC PRESSURE 29.92 IN. Hg

1. ENTER CHART AT OUTSIDE AIR TEMPERATURE OF 100 °F.
2. GO TO 50% RELATIVE HUMIDITY.
3. HEAT OUTSIDE AIR TO CABIN TEMPERATURE OF 107.2 °F AT CONSTANT SPECIFIC HUMIDITY.
4. GO TO A WET BULB TEMPERATURE OF 84.5 °F AT A CABIN RELATIVE HUMIDITY OF 41%.



APPENDIX E. TEST DATA

INDEX

FIGURE 1
FIRST PASS DATA COMPRESSION ARRAY
AH-1 USA S/N 67-15844

PAGE 1 OF 4

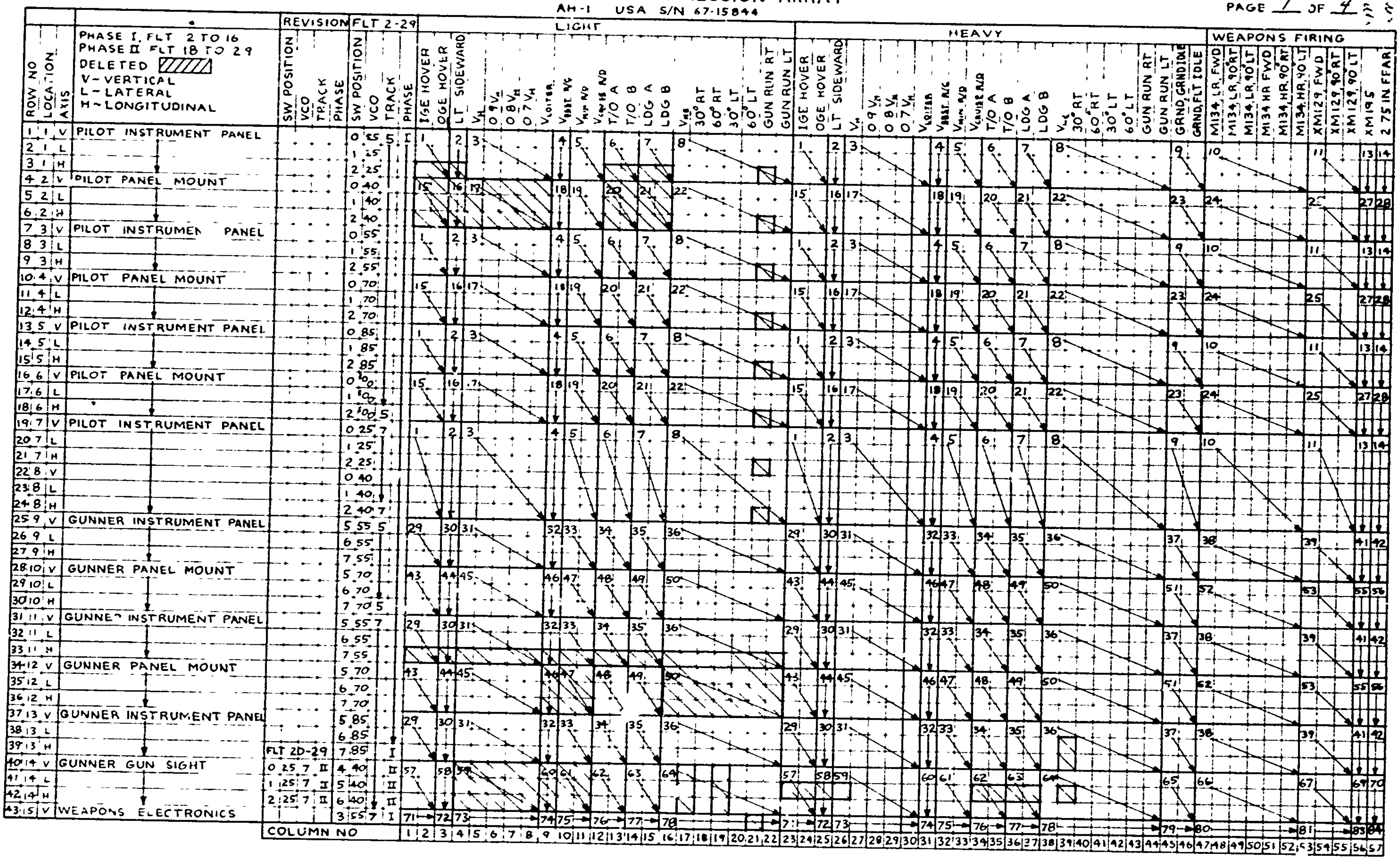


FIGURE 1
FIRST PASS DATA COMPRESSION ARRAY
AH-1G USA S/N 67 15844

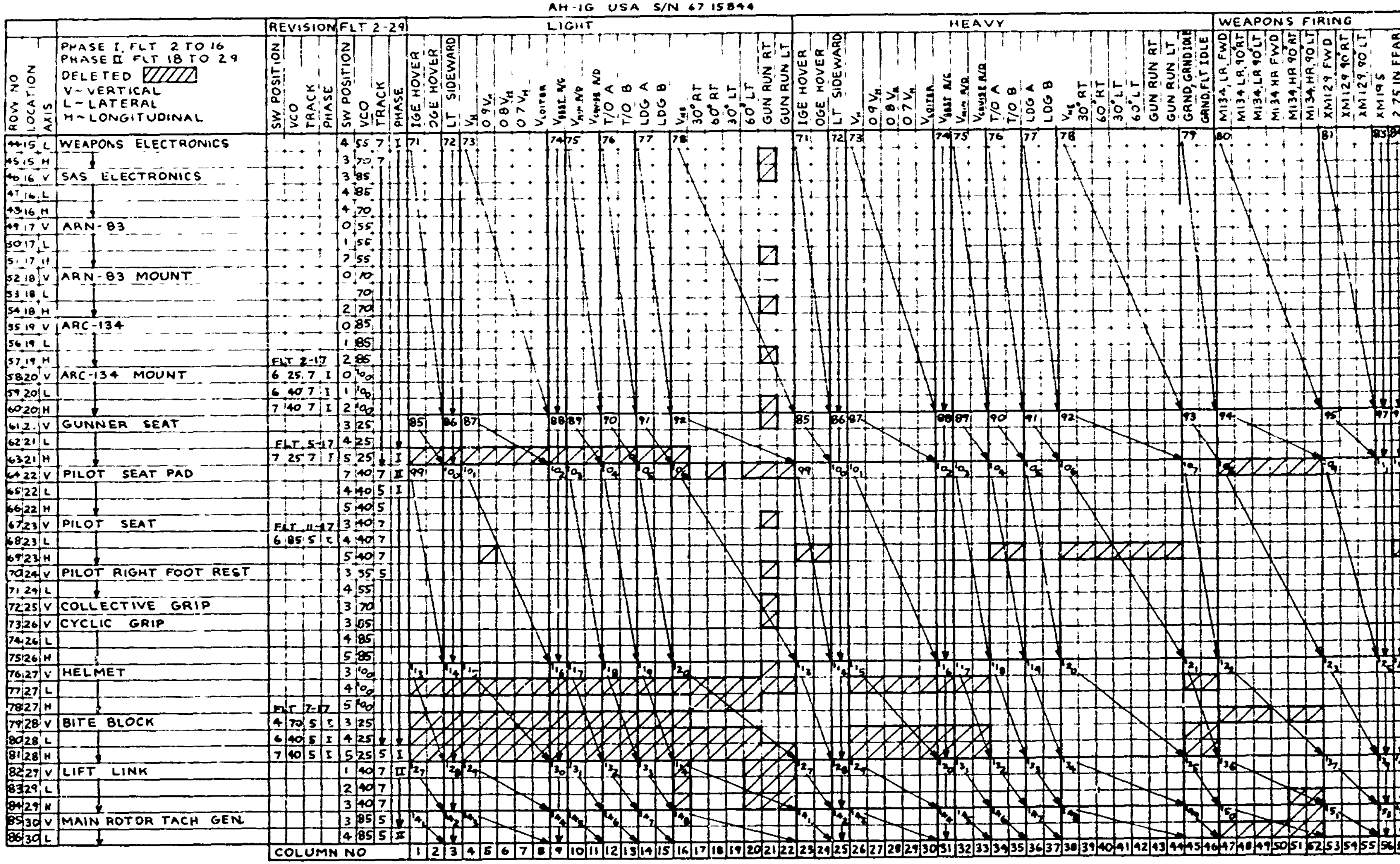


FIGURE /
FIRST PASS DATA COMPRESSION ARRAY
AH-1G USA S/N 67-15844

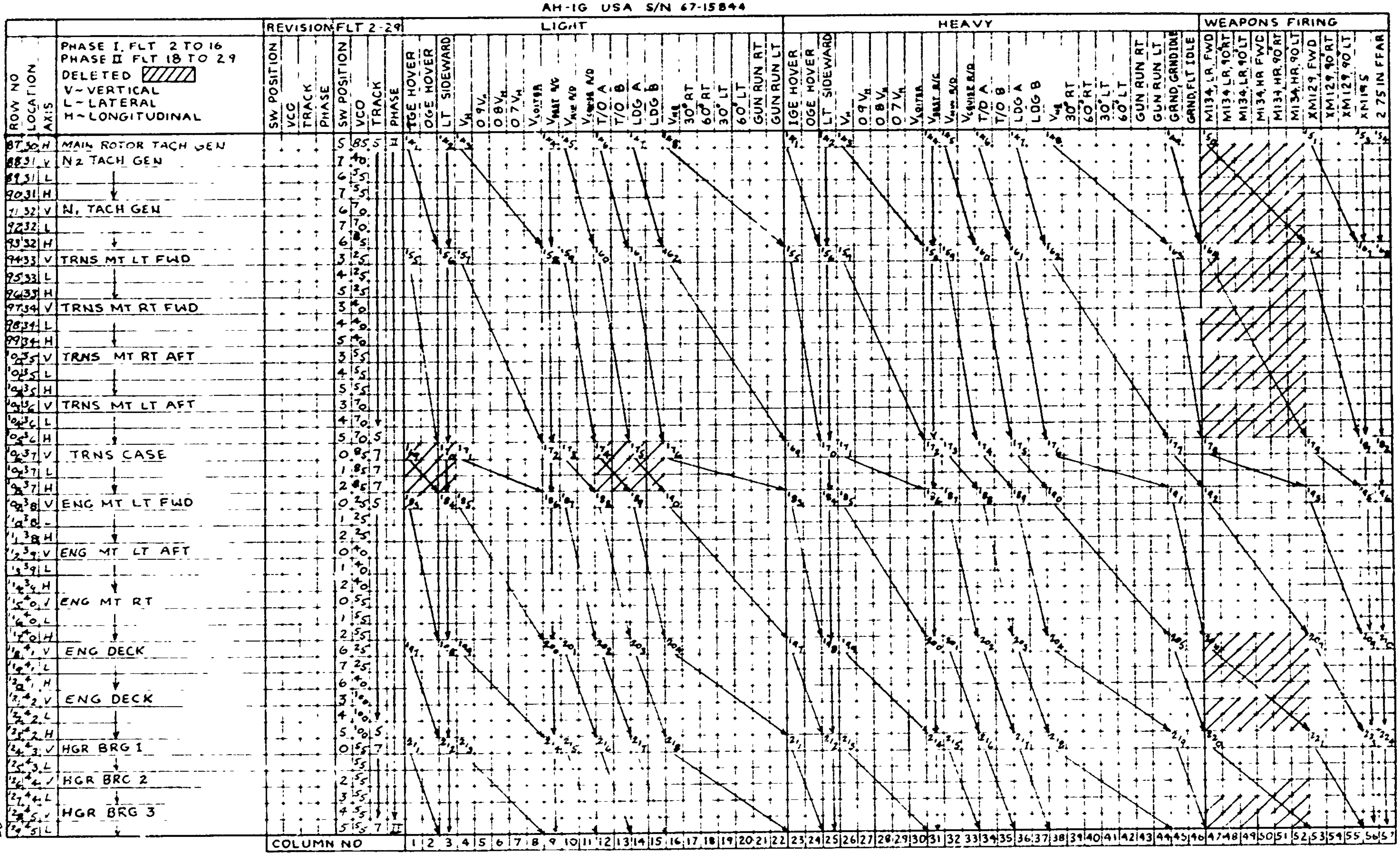


FIGURE 1
FIRST PASS DATA COMPRESSION ARRAY
AH-1G USA S/N 67 15844

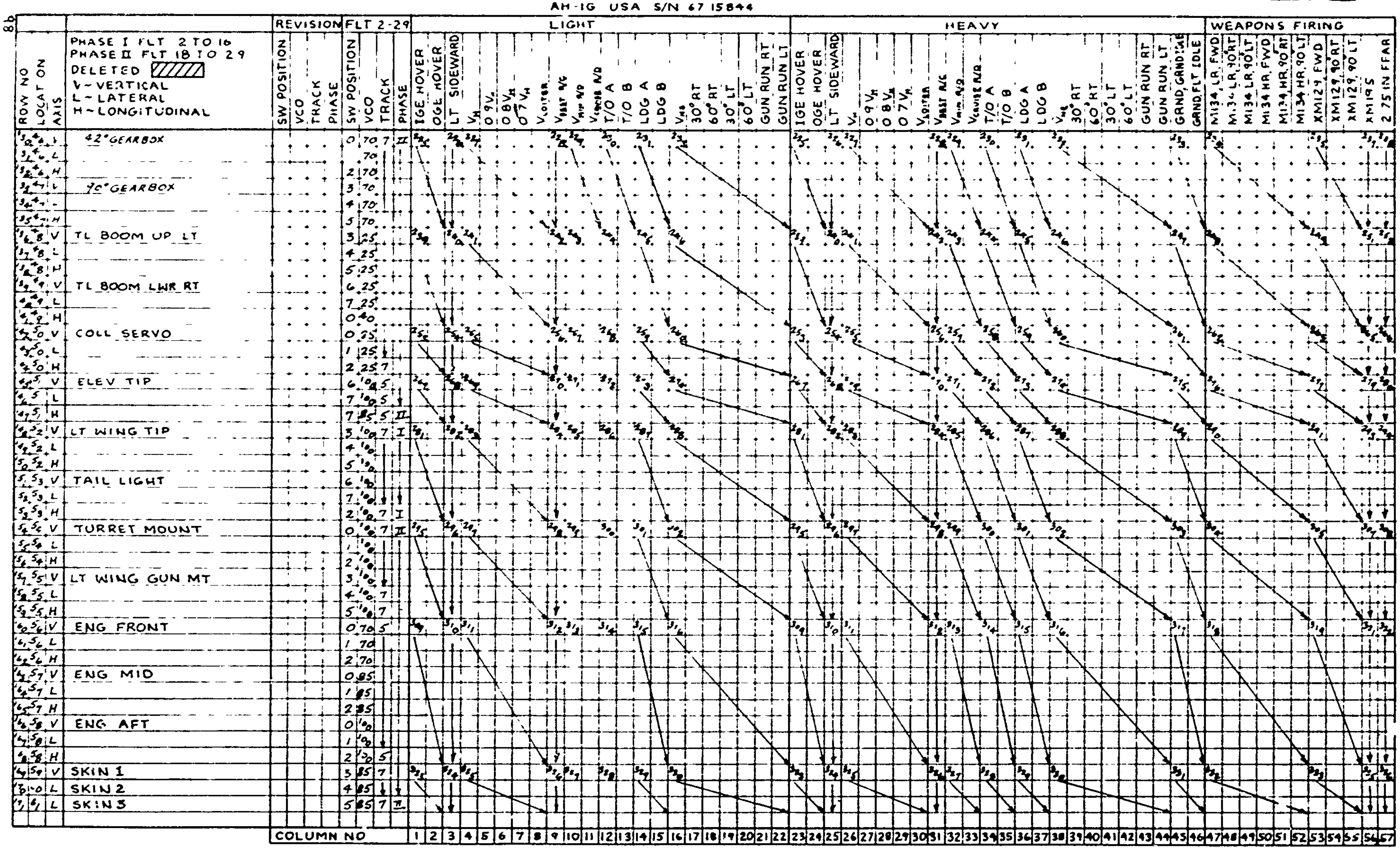


FIGURE 2
SECOND PASS DATA COMPRESSION ARRAY
AH-1G USA S/N 67-15844

PHASE I, FLT 2 TO 16
PHASE II FLT 18 TO 29
DELETED (hatched)
V – VERTICAL
L – LATERAL
H – LONGITUDINAL

ROW NO	LOCATION	AXIS		REVISION SW POSITION	REVISION VCO	REVISION TRACK	REVISION PHASE	FLT 2-29 SW POSITION	FLT 2-29 VCO	FLT 2-29 TRACK	FLT 2-29 PHASE
1	1	V	PILOT INST PANEL					0	25	5	I
2	1	L						1	25		
3	1	H						2	25		
4	2	V	PILOT PANEL STRCT					0	40		
5	2	L						1	40		
6	2	H						2	40		
7	3	V	PILOT INST PANEL					0	55		
8	3	L						1	55		
9	3	H						2	55		
10	4	V	PILOT PANEL STRCT					0	70		
11	4	L						1	70		
12	4	H						2	70		
13	5	V	PILOT INST PANEL					0	85		
14	5	L						1	85		
15	5	H						2	85		
16	6	V	PILOT PANEL STRCT					0	[illegible]		
17	6	L						1	[illegible]		
18	6	H						2	[illegible]	5	
19	7	V	PILOT INST PANEL					0	25	7	
20	7	L						1	25		
21	7	H						2	25		
22	8	V						0	40		
23	8	L						1	40		
24	8	H						2	40	7	
25	9	V	GUN INST PANEL					5	55	5	
26	9	L						6	55		
27	9	H						7	55		
28	10	V	GUN PANEL STRCT					5	70		
29	10	L						6	70		
30	10	H						7	70	5	
31	11	V	GUN INST PANEL					5	55	7	
32	11	L						6	55		
33	11	H						7	55		
34	12	V	GUN PANEL STRCT					5	70		
35	12	L						6	70		
36	12	H						7	70		
37	13	V	GUN INST PANEL					5	85		
38	13	L						6	85		
39	13	H						7	85		I
40	14	V	GUNNER GUN SIGHT	0	25	7	[illegible]	4	40		II
41	14	L		1	25	7	[illegible]	5	40		II
42	14	H		2	25	7	[illegible]	6	40		II
43	15	V	WEAPONS ELECT					3	55	7	I

COLUMN NO		
1	LIGHT	IGE HOVER
2	LIGHT	OGE HOVER
3	LIGHT	LT SIDEWARD
4	LIGHT	V_H
5	LIGHT	0.9 V_H
6	LIGHT	0.8 V_H
7	LIGHT	0.7 V_H
8	LIGHT	V_{LOITER}
9	LIGHT	$V_{BEST\ R/C}$
10	LIGHT	$V_{MIN\ R/D}$
11	LIGHT	$V_{CRUISE\ R/D}$
12	LIGHT	T/O A
13	LIGHT	T/O B
14	LIGHT	LDG A
15	LIGHT	LDG B
16	LIGHT	V_{NE}
17	LIGHT	30° RT
18	LIGHT	60° RT
19	LIGHT	30° LT
20	LIGHT	60° LT
21	LIGHT	GUN RUN RT
22	LIGHT	GUN RUN LT
23	HEAVY	IGE HOVER
24	HEAVY	OGE HOVER
25	HEAVY	LT SIDEWARD
26	HEAVY	V_H
27	HEAVY	0.9 V_H
28	HEAVY	0.8 V_H
29	HEAVY	0.7 V_H
30	HEAVY	V_{LOITER}
31	HEAVY	$V_{BEST\ R/C}$
32	HEAVY	$V_{MIN\ R/D}$
33	HEAVY	$V_{CRUISE\ R/D}$
34	HEAVY	T/O A
35	HEAVY	T/O B
36	HEAVY	LDG A
37	HEAVY	LDG B
38	HEAVY	V_{NE}
39	HEAVY	30° RT
40	HEAVY	60° RT
41	HEAVY	30° LT
42	HEAVY	60° LT
43	HEAVY	GUN RUN RT
44	HEAVY	GUN RUN LT
45	HEAVY	GRND GRND IDLE
46	HEAVY	GRND FLT IDLE
47	WEAPONS FIRING	M134 LR FWD
48	WEAPONS FIRING	M134 LR 90 RT
49	WEAPONS FIRING	M134 LR 90 LT
50	WEAPONS FIRING	M134 HR FWD
51	WEAPONS FIRING	M134 HR 90 RT
52	WEAPONS FIRING	M134 HR 90 LT
53	WEAPONS FIRING	XM129 FWD
54	WEAPONS FIRING	XM129 90 RT
55	WEAPONS FIRING	XM129 90 LT
56	WEAPONS FIRING	XM195
57	WEAPONS FIRING	2.75 IN FFAR

FIGURE 2
SECOND PASS DATA COMPRESSION ARRAY
AH-1G USA S/N 67-15844

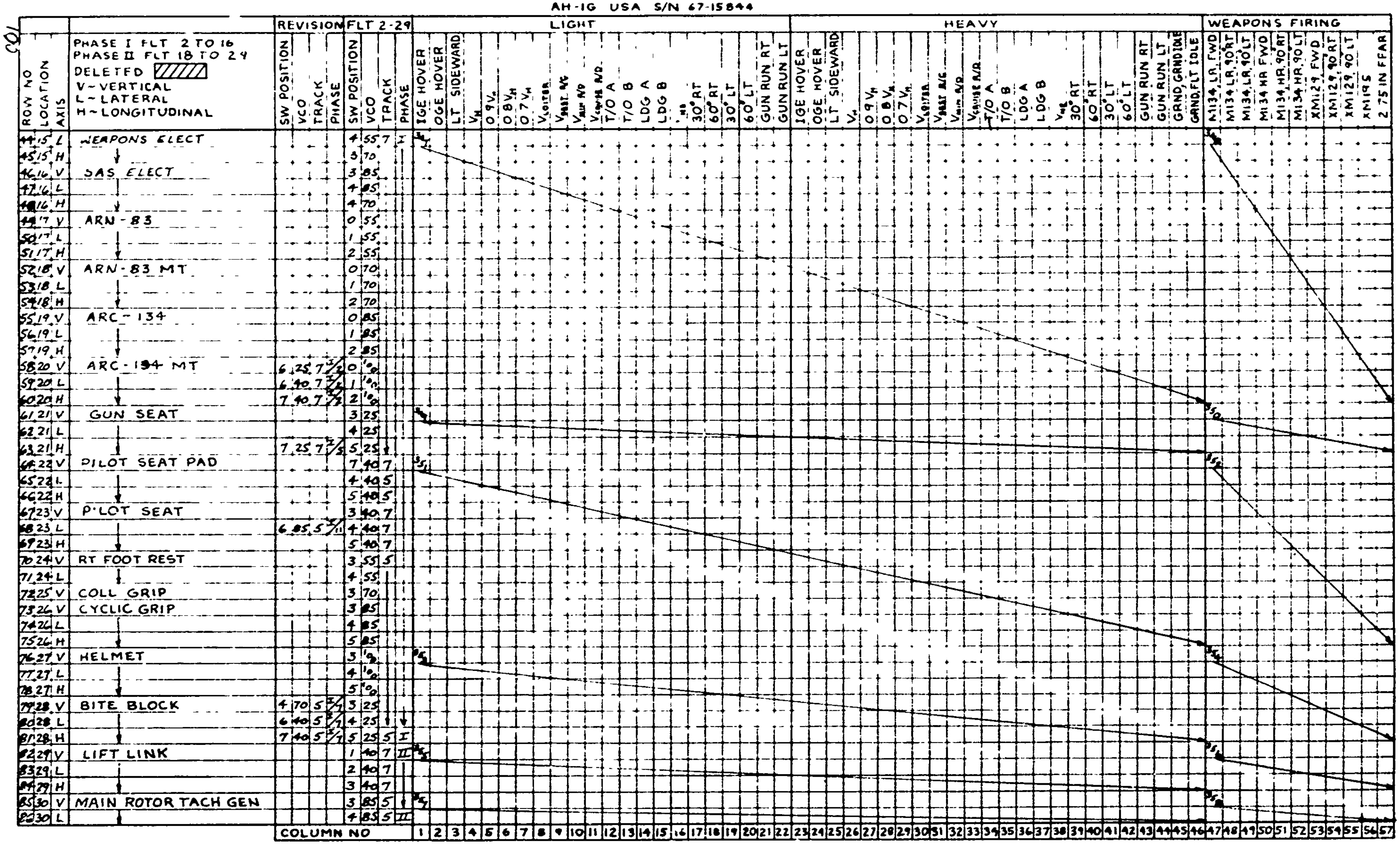


FIGURE 2

SECOND PASS DATA COMPRESSION ARRAY

AH-1G USA S/N 67-15844

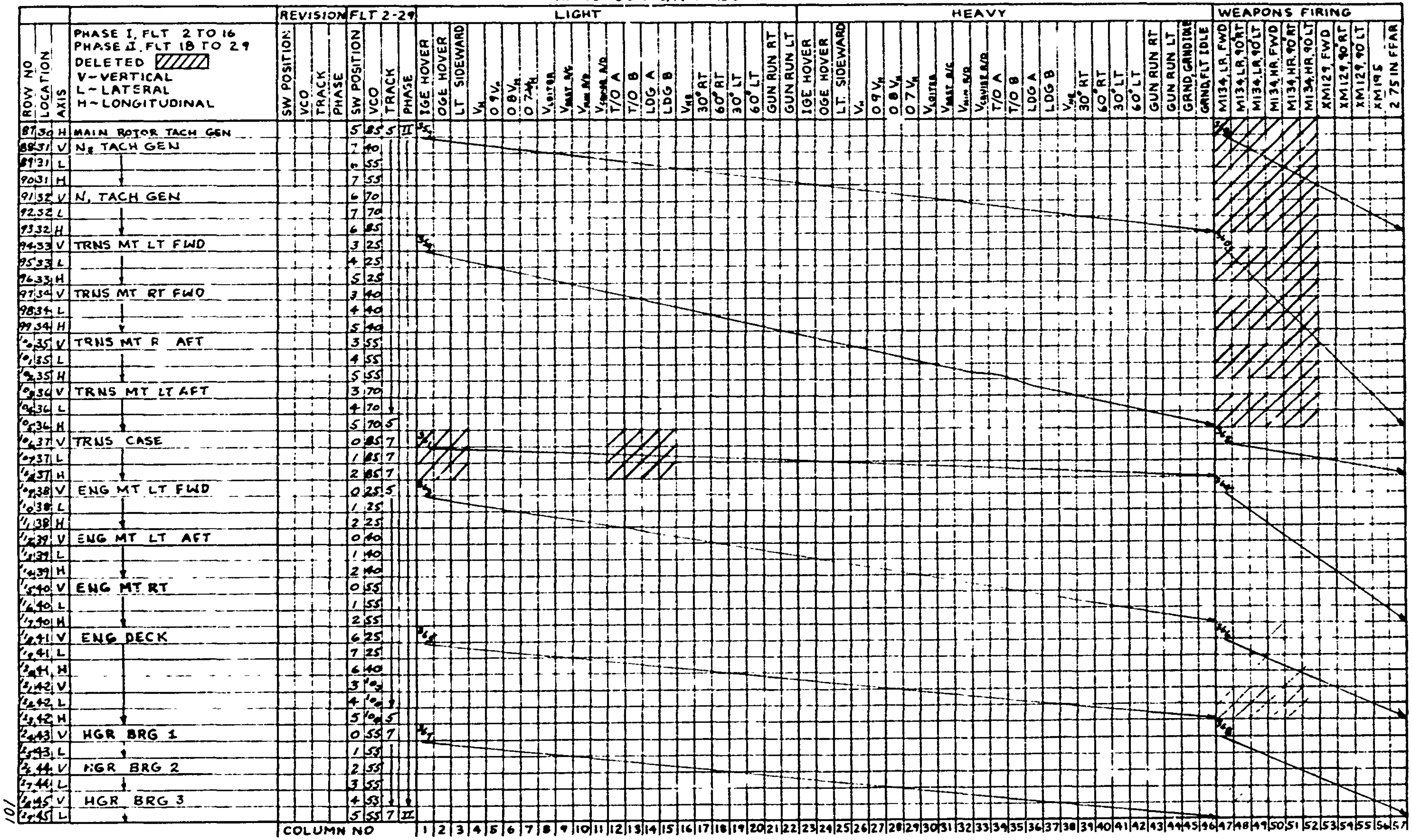


FIGURE 2
SECOND PASS DATA COMPRESSION ARRAY
AH-1G USA S/N 67-15844

PHASE I, FLT 2 TO 16
PHASE II FLT 18 TO 29
DELETED ▨
V ~ VERTICAL
L ~ LATERAL
H ~ LONGITUDINAL

LOCATION	AXIS		REVISION SW POSITION	REVISION VCO	REVISION TRACK	REVISION PHASE	FLT 2-29 SW POSITION	FLT 2-29 VCO	FLT 2-29 TRACK	FLT 2-29 PHASE
46	V	42° GEARBOX					0	70	7	II
46	L							70		
46	H						2	70		
47	V	90° GEARBOX					3	70		
47	L						4	70		
47	H						5	70		
48	V	TL BOOM UP LT					3	25		
48	L						4	25		
48	H						5	25		
49	V	TL BOOM LWR RT					6	25		
49	L						7	25		
49	H						0	40		
50	V	COLL SERVO	6	70	7	[illegible]	0	25		
50	L		7	70	7	[illegible]	1	25		
50	H		7	55	7	[illegible]	2	25	7	
51	V	ELEV TIP					6	100	5	
51	L						7	100	5	
51	H						7	85	5	II
52	V	LT WING TIP					3	100	7	I
52	L						4	100		
52	H						5	100		
53	V	TAIL LIGHT					6	100		
53	L						7	100		
53	H		1	100	7	[illegible]	2	100	7	I
54	V	TURRET MOUNT					0	100		II
54	L						1	100		
54	H						2	100		
55	V	LT WING GUN MT					3	100		
55	L						4	100		
55	H						5	100	7	
56	V	ENG FRONT					0	70	5	
56	L						1	70		
56	H						2	70		
57	V	ENG MID					0	85		
57	L						1	85		
57	H						2	85		
58	V	ENG AFT					0	100		
58	L						1	100		
58	H						2	100	5	
59	V	SKIN 1					3	85	7	
60	L	SKIN 2					4	85	7	
61	L	SKIN 3					5	85	7	II

COLUMN NO	Condition
	LIGHT
1	IGE HOVER
2	OGE HOVER
3	LT SIDEWARD
4	V_H
5	$0.9 V_H$
6	$0.8 V_H$
7	$0.7 V_H$
8	V_{OSITRA}
9	$V_{BEST\ R/C}$
10	$V_{MIN\ R/D}$
11	$V_{CRUISE\ R/D}$
12	T/O A
13	T/O B
14	LDG A
15	LDG B
16	V_{NE}
17	30° RT
18	60° RT
19	30° LT
20	60° LT
21	GUN RUN RT
22	GUN RUN LT
	HEAVY
23	IGE HOVER
24	OGE HOVER
25	LT SIDEWARD
26	V_H
27	$0.9 V_H$
28	$0.8 V_H$
29	$0.7 V_H$
30	V_{OSITRA}
31	$V_{BEST\ R/C}$
32	$V_{MIN\ R/D}$
33	$V_{CRUISE\ R/D}$
34	T/O A
35	T/O B
36	LDG A
37	LDG B
38	V_{NE}
39	30° RT
40	60° RT
41	30° LT
42	60° LT
43	GUN RUN RT
44	GUN RUN LT
45	GRND, GRND IDLE
46	GRND, FLT IDLE
	WEAPONS FIRING
47	M134, LR, FWD
48	M134, LR, 90 RT
49	M134, LR, 90 LT
50	M134, HR, FWD
51	M134, HR, 90 RT
52	M134, HR, 90 LT
53	XM129, FWD
54	XM129, 90 RT
55	XM129, 90 LT
56	XM195
57	2.75 IN FFAR

FIGURE 3
THIRD PASS DATA COMPRESSION ARRAY
AH-1G USA S/N 67-15844

PHASE I, FLT 2 TO 16
PHASE II FLT 18 TO 29
DELETED (hatched)
V~VERTICAL
L~LATERAL
H~LONGITUDINAL

ROW NO	LOCATION	AXIS		REVISION SW POSITION	REVISION VCO	REVISION TRACK	REVISION PHASE	FLT 2-29 SW POSITION	FLT 2-29 VCO	FLT 2-29 TRACK	FLT 2-29 PHASE
1	1	V	PILOT INST PANEL					0	25	5	1
2	1	L						1	25		
3	1	H						2	25		
4	2	V	PILOT PANEL STRCT					0	40		
5	2	L						1	40		
6	2	H						2	40		
7	3	V	PILOT INST PANEL					0	55		
8	3	L						1	55		
9	3	H						2	55		
10	4	V	PILOT PANEL STRCT					0	70		
11	4	L						1	70		
12	4	H						2	70		
13	5	V	PILOT INST PANEL					0	85		
14	5	L						1	85		
15	5	H						2	85		
16	6	V	PILOT PANEL STRCT					0	100		
17	6	L						1	100		
18	6	H						2	100	5	
19	7	V	PILOT INST PANEL					0	25	7	
20	7	L						1	25		
21	7	H						2	25		
22	8	V						0	40		
23	8	L						1	40		
24	8	H						2	40	7	
25	9	V	GUN INST PANEL					5	55	5	
26	9	L						6	55		
27	9	H						7	55		
28	10	V	GUN PANEL STRCT					5	70		
29	10	L						6	70		
30	10	H						7	70	5	
31	11	V	GUN INST PANEL					5	55	7	
32	11	L						6	55		
33	11	H						7	55		
34	12	V	GUN PANEL STRCT					5	70		
35	12	L						6	70		
36	12	H						7	70		
37	13	V	GUN INST PANEL					5	85		
38	13	L						6	25		
39	13	H						7	85		I
40	14	V	GUNNER GUN SIGHT	0	25	7		4	40	7	II
41	14	L		1	25	7		5	40		II
42	14	H		2	25	7		6	40		II
43	15	V	WEAPONS ELECT					3	55	7	I

COLUMN NO		
1	LIGHT	IGE HOVER
2	LIGHT	OGE HOVER
3	LIGHT	LT SIDEWARD
4	LIGHT	V_H
5	LIGHT	0.9 V_H
6	LIGHT	0.8 V_H
7	LIGHT	0.7 V_H
8	LIGHT	V_{LOITER}
9	LIGHT	$V_{BEST\ R/C}$
10	LIGHT	$V_{MIN\ R/D}$
11	LIGHT	$V_{CRUISE\ R/D}$
12	LIGHT	T/O A
13	LIGHT	T/O B
14	LIGHT	LDG A
15	LIGHT	LDG B
16	LIGHT	V_{NE}
17	LIGHT	30° RT
18	LIGHT	60° RT
19	LIGHT	30° LT
20	LIGHT	60° LT
21	LIGHT	GUN RUN RT
22	LIGHT	GUN RUN LT
23	HEAVY	IGE HOVER
24	HEAVY	OGE HOVER
25	HEAVY	LT SIDEWARD
26	HEAVY	V_H
27	HEAVY	0.9 V_H
28	HEAVY	0.8 V_H
29	HEAVY	0.7 V_H
30	HEAVY	V_{LOITER}
31	HEAVY	$V_{BEST\ R/C}$
32	HEAVY	$V_{MIN\ R/D}$
33	HEAVY	$V_{CRUISE\ R/D}$
34	HEAVY	T/O A
35	HEAVY	T/O B
36	HEAVY	LDG A
37	HEAVY	LDG B
38	HEAVY	V_{NE}
39	HEAVY	30° RT
40	HEAVY	60° RT
41	HEAVY	30° LT
42	HEAVY	60° LT
43	HEAVY	GUN RUN RT
44	HEAVY	GUN RUN LT
45	HEAVY	GRND, GRND IDLE
46	HEAVY	GRND, FLT IDLE
47	WEAPONS FIRING	M134, LR, FWD
48	WEAPONS FIRING	M134, LR, 90° RT
49	WEAPONS FIRING	M134, LR, 90° LT
50	WEAPONS FIRING	M134, HR, FWD
51	WEAPONS FIRING	M134, HR, 90° RT
52	WEAPONS FIRING	M134, HR, 90° LT
53	WEAPONS FIRING	XM129, FWD
54	WEAPONS FIRING	XM129, 90° RT
55	WEAPONS FIRING	XM129, 90° LT
56	WEAPONS FIRING	XM195
57	WEAPONS FIRING	2.75 IN FFAR

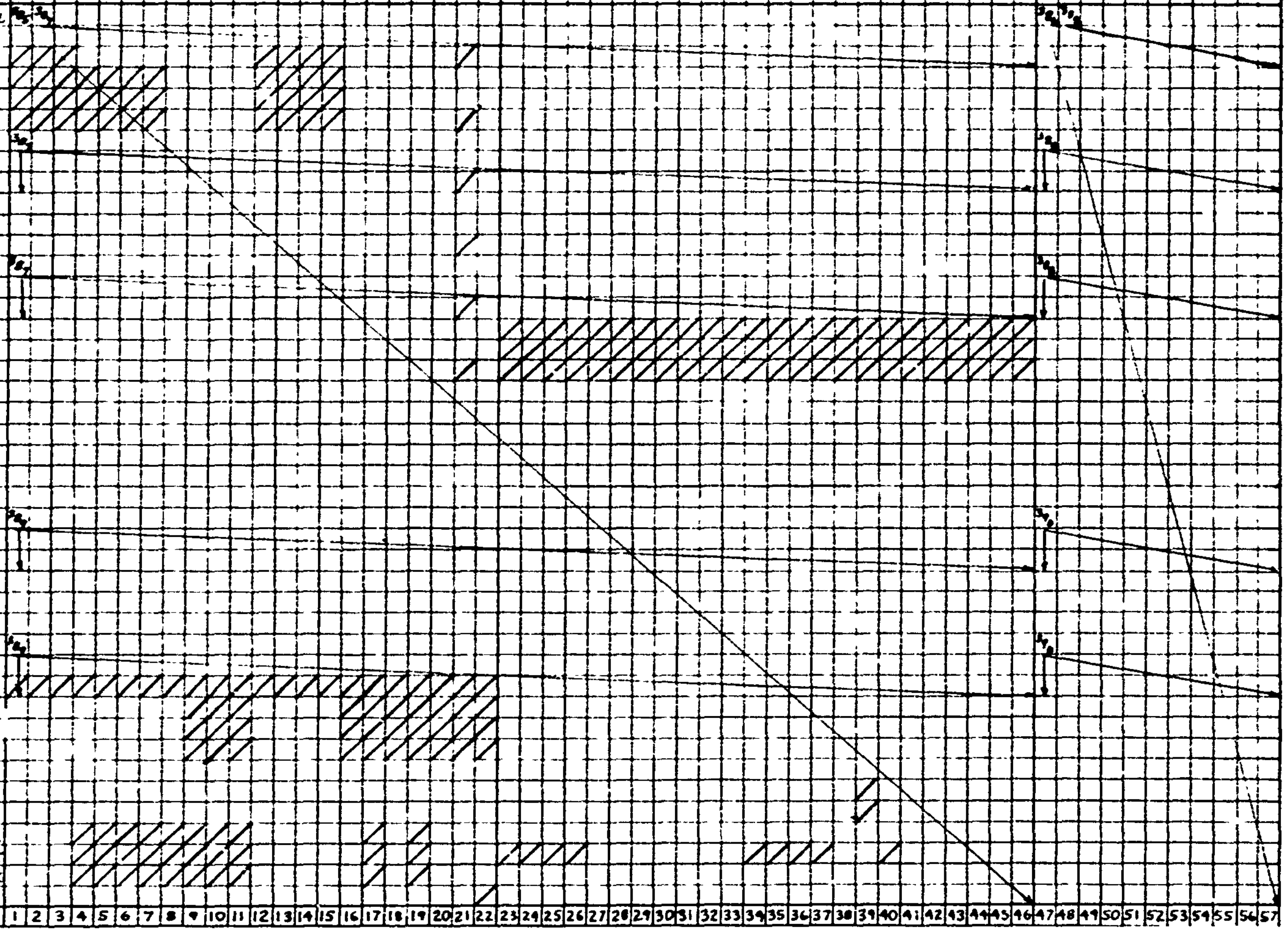


FIGURE 3
THIRD PASS DATA COMPRESSION ARRAY
AH-1G USA S/N 67-15844

PHASE I, FLT 2 TO 16
PHASE II, FLT 18 TO 29
DELETED (hatched)
V ~ VERTICAL
L ~ LATERAL
H ~ LONGITUDINAL

ROW NO	LOCATION	AXIS		REVISION SW POSITION	REVISION VCO	REVISION TRACK	REVISION PHASE	FLT 2-29 SW POSITION	FLT 2-29 VCO	FLT 2-29 TRACK	FLT 2-29 PHASE
44	15	L	WEAPONS ELECT					4	55	7	I
45	15	H						3	70	7	
46	6	V	SAS ELECT					3	85		
47	16	L						4	85		
48	16	H						4	70		
49	17	V	ARN-83					0	55		
50	17	L						1	55		
51	17	H						2	55		
52	18	V	ARN-83 MT					0	70		
53	18	L						1	70		
54	18	H						2	70		
55	19	V	ARC-134					0	85		
56	19	L						1	85		
57	19	H						2	85		
58	20	V	ARC-134 MT	6	25	7	I 2	0	100		
59	20	L		6	40	7	I 2	1	100		
60	20	H		7	40	7	I 2	2	100		
61	21	V	GUN SEAT					3	25		
62	21	L						4	25		
63	21	H		7	25	7	I 5	5	25		I
64	22	V	PILOT SEAT PAD					7	40	7	I
65	22	L						4	40	5	I
66	22	H						5	40	5	
67	23	V	PILOT SEAT					3	40	7	
68	23	L		6	85	5	I 11	4	40	7	
69	23	H						5	40	7	
70	24	V	RT FOOT REST					3	55	5	
71	24	L						4	55		
72	25	V	COLL GRIP					3	70		
73	26	V	CYCLIC GRIP					3	85		
74	26	L						4	85		
75	26	H						5	85		
76	27	V	HELMET					3	100		
77	27	L						4	100		
78	27	H						5	100		
79	28	V	BITE BLOCK	4	70	5	I 7	3	25		
80	28	L		6	40	5	I 7	4	25		
81	28	H		7	40	5	I 7	5	25	5	I
82	29	V	LIFT LINK					1	40	7	II
83	29	L						2	40	7	
84	29	H						3	40	7	
85	30	V	MAIN ROTOR TACH GEN					3	85	5	
86	30	L						4	85	5	II

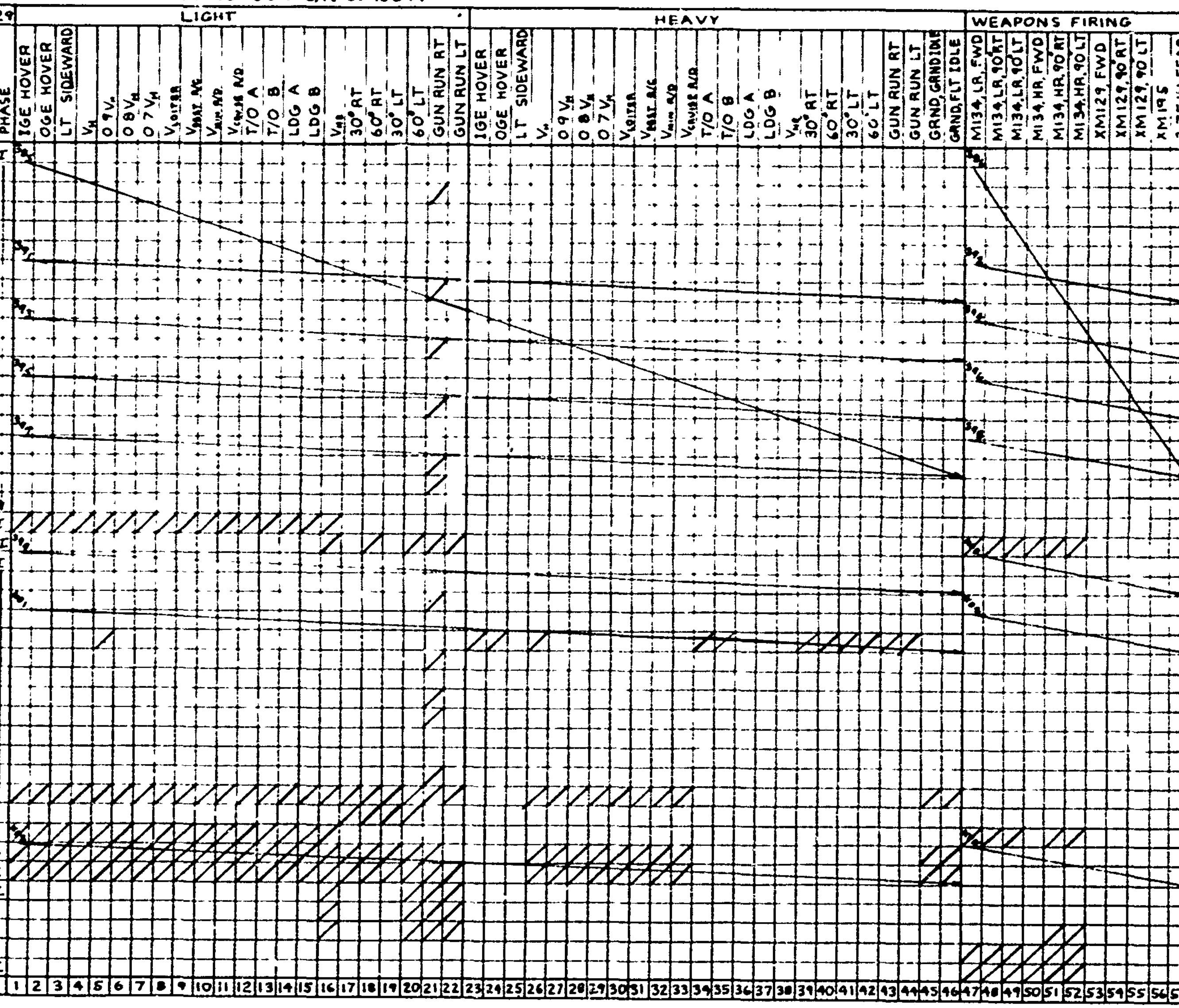


FIGURE 3
THIRD PASS DATA COMPRESSION ARRAY
AH-1G USA S/N 67-15844

PHASE I, FLT 2 TO 16
PHASE II FLT 18 TO 29
DELETED (hatched)
V ~ VERTICAL
L ~ LATERAL
H ~ LONGITUDINAL

				REVISION				FLT 2-29				LIGHT																							HEAVY																								WEAPONS FIRING									
ROW NO	LOCATION	AXIS		SW POSITION	VCO	TRACK	PHASE	SW POSITION	VCO	TRACK	PHASE		IGE HOVER	OGE HOVER	LT SIDEWARD	V_H	0.9 V_H	0.8 V_H	0.7 V_H	V_{LOITER}	$V_{BEST\ R/C}$	$V_{MIN\ R/D}$	$V_{CRUISE\ R/D}$	T/O A	T/O B	LDG A	LDG B	V_{NE}	30° RT	60° RT	30° LT	60° LT	GUN RUN RT	GUN RUN LT	IGE HOVER	OGE HOVER	LT SIDEWARD	V_H	0.9 V_H	0.8 V_H	0.7 V_H	V_{LOITER}	$V_{BEST\ R/C}$	$V_{MIN\ R/D}$	$V_{CRUISE\ R/D}$	T/O A	T/O B	LDG A	LDG B	V_{NE}	30° RT	60° RT	30° LT	60° LT	GUN RUN RT	GUN RUN LT	GRND, GRND IDLE	GRND, FLT IDLE	M134, LR, FWD	M134, LR, 90° RT	M134, LR, 90° LT	M134, HR, FWD	M134, HR, 90° RT	M134, HR, 90° LT	XM129, FWD	XM129, 90° RT	XM129, 90° LT	XM19S	2.75 IN FFAR
87	31	H	MAIN ROTOR TACH GEN					5	85	5	II																																																										
88	31	V	N2 TACH GEN					7	40																																																											
89	31	L						6	55																																																											
90	31	H						7	55	5	II																																																											
COLUMN NO												1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57

FIG 4

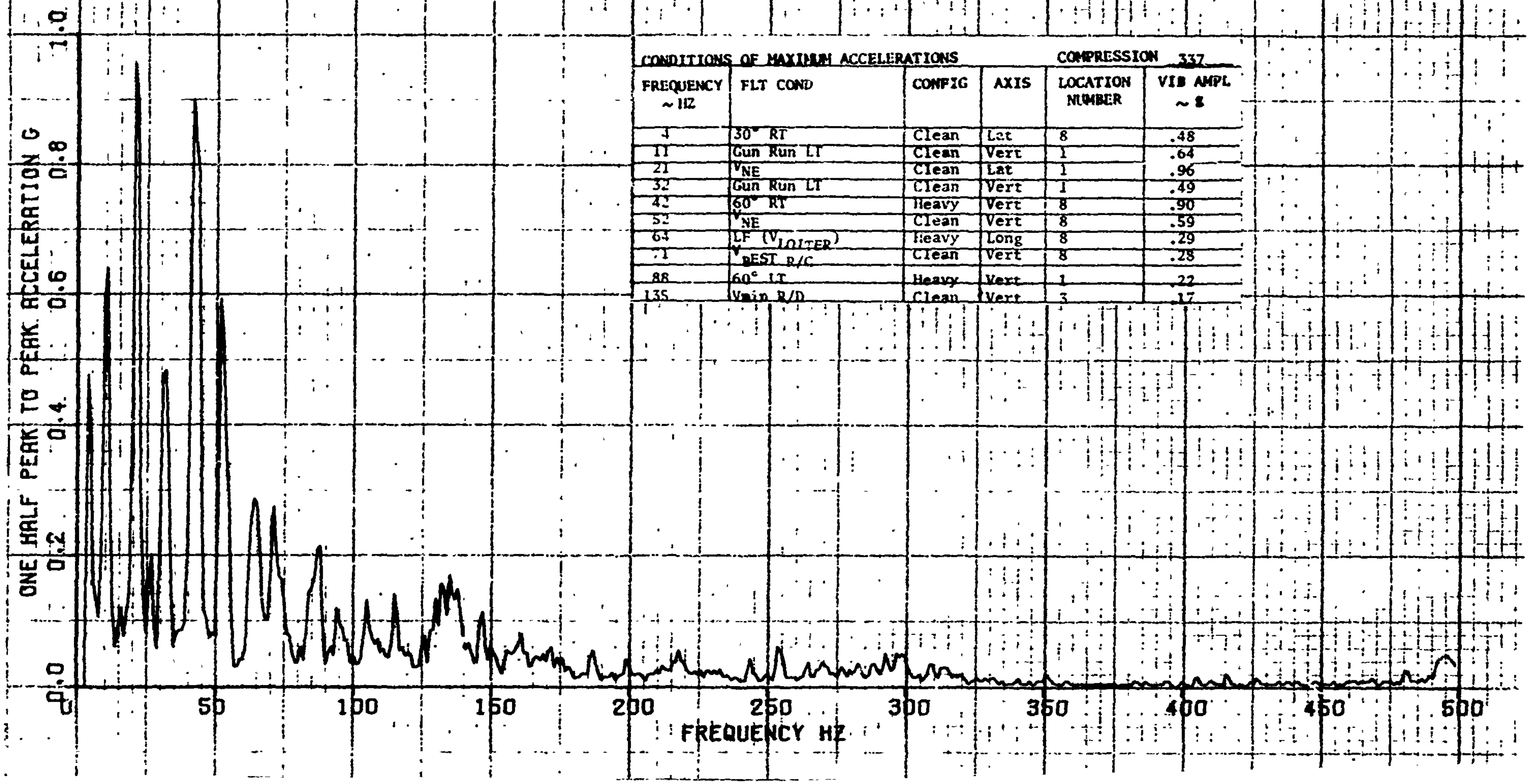
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMBINED NONFIRING TEST CONDS PILOT INSTR PNL-COMB AXIS VIB PLOT 337

SENSOR LOC 1,3,5,7,8 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 337

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
4	30° RT	Clean	Lat	8	.48
11	Gun Run LT	Clean	Vert	1	.64
21	V_{NE}	Clean	Lat	1	.96
32	Gun Run LT	Clean	Vert	1	.49
42	60° RT	Heavy	Vert	8	.90
52	V_{NE}	Clean	Vert	8	.59
64	LF (V_{LOITER})	Heavy	Long	8	.29
71	$V_{BEST\ R/C}$	Clean	Vert	8	.28
88	60° LT	Heavy	Vert	1	.22
135	Vmin R/D	Clean	Vert	3	.17

FIG 5
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS PILOT INSTR PNL-COMB AXIS VIB PLOT 337
SENSOR LOC 1,3,5,7,8 COMPRESSION PASS NO.2

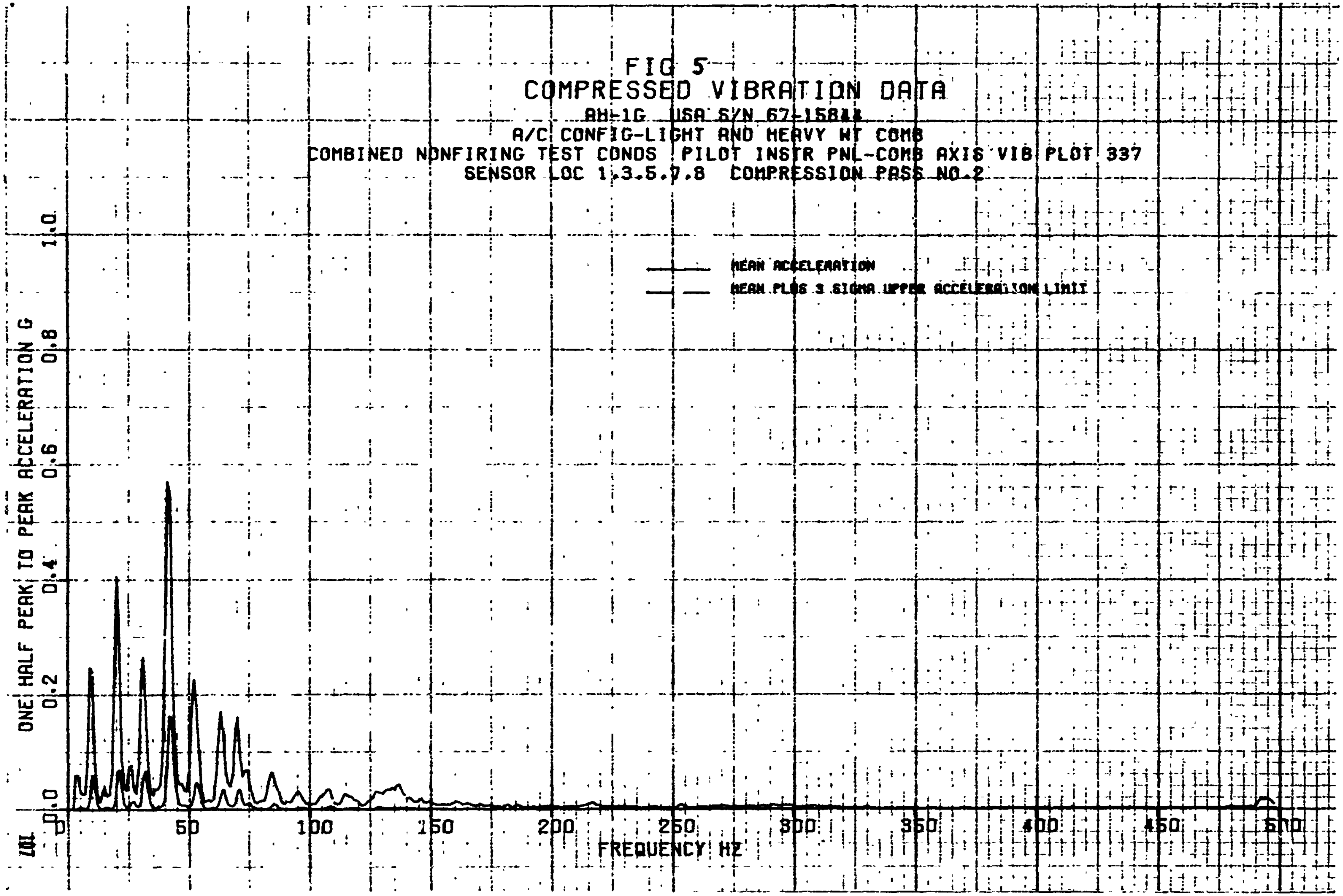
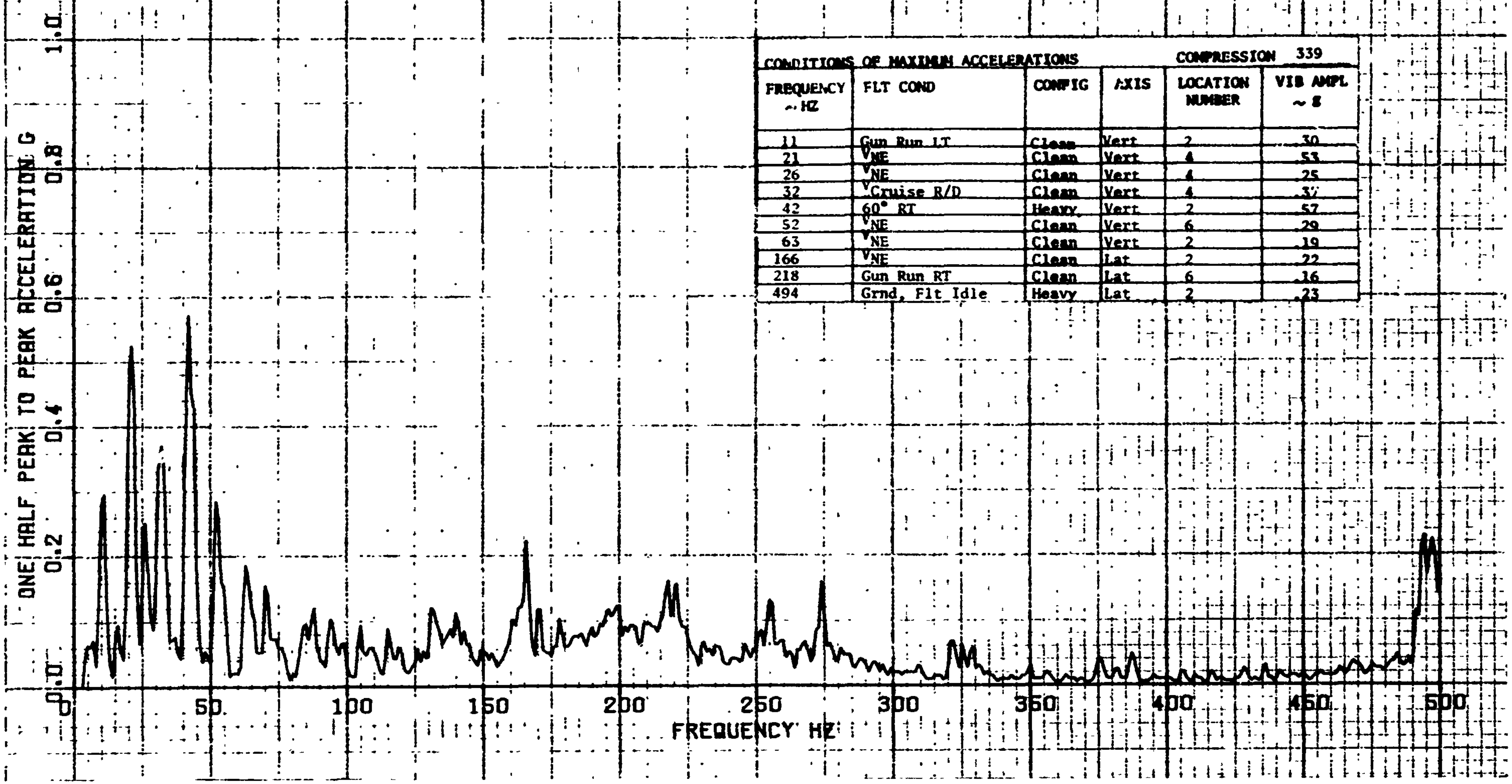


FIG 6
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS POLOT PNL STRCT-COMB AXIS VIB PLOT 339
SENSOR LOC 2.4.6 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 339

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
11	Gun Run LT	Clean	Vert	2	.30
21	V_{NE}	Clean	Vert	4	.53
26	V_{NE}	Clean	Vert	4	.25
32	V_{Cruise} R/D	Clean	Vert	4	.37
42	60° RT	Heavy	Vert	2	.57
52	V_{NE}	Clean	Vert	6	.29
63	V_{NE}	Clean	Vert	2	.19
166	V_{NE}	Clean	Lat	2	.22
218	Gun Run RT	Clean	Lat	6	.16
494	Grnd, Flt Idle	Heavy	Lat	2	.23

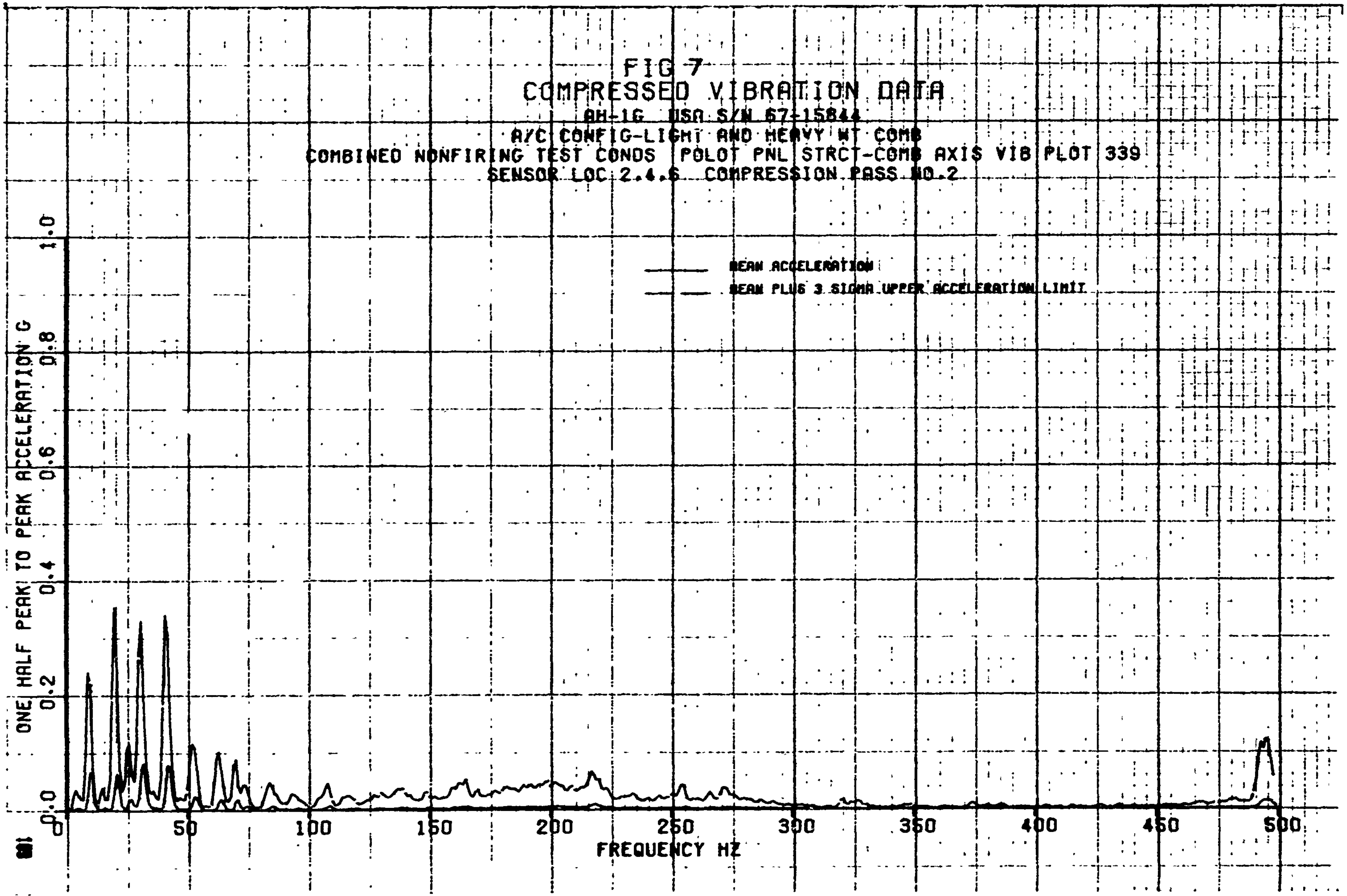


FIG 7
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS POLOT PNL STRCT-COMB AXIS VIB PLOT 339
SENSOR LOC 2.4.6 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 8

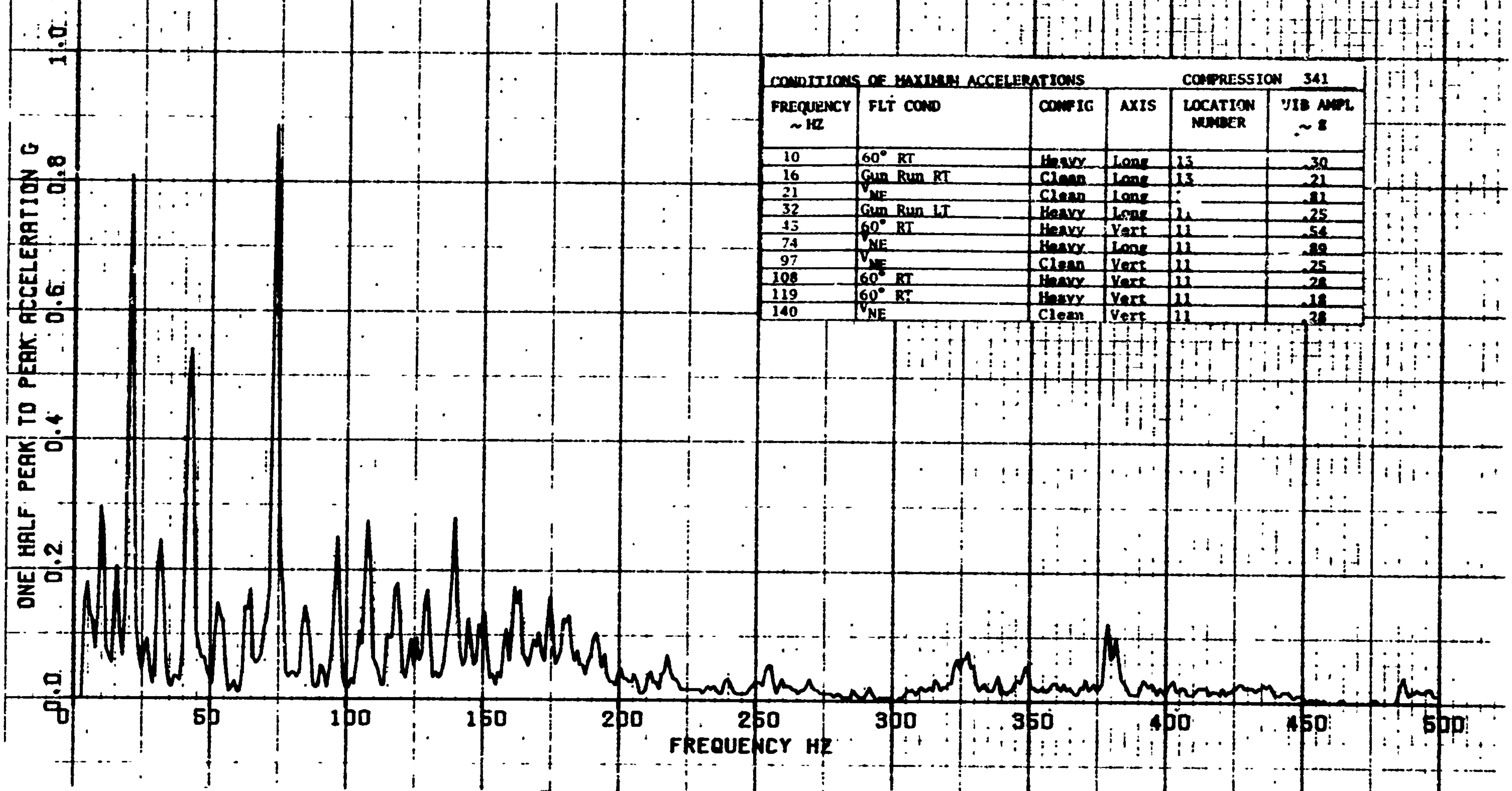
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMBINED NONFIRING TEST CONDS GUNNER INSTR PNL-COMB AXIS VIB PLOT 341

SENSOR LOC 9.11.13 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 341

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
10	60° RT	Heavy	Long	13	.30
16	Gun Run RT	Clean	Long	13	.21
21	V_{NE}	Clean	Long	[illegible]	.81
32	Gun Run LT	Heavy	Long	11	.25
43	60° RT	Heavy	Vert	11	.54
74	V_{NE}	Heavy	Long	11	.89
97	V_{NE}	Clean	Vert	11	.25
108	60° RT	Heavy	Vert	11	.28
119	60° RT	Heavy	Vert	11	.18
140	V_{NE}	Clean	Vert	11	.38

110

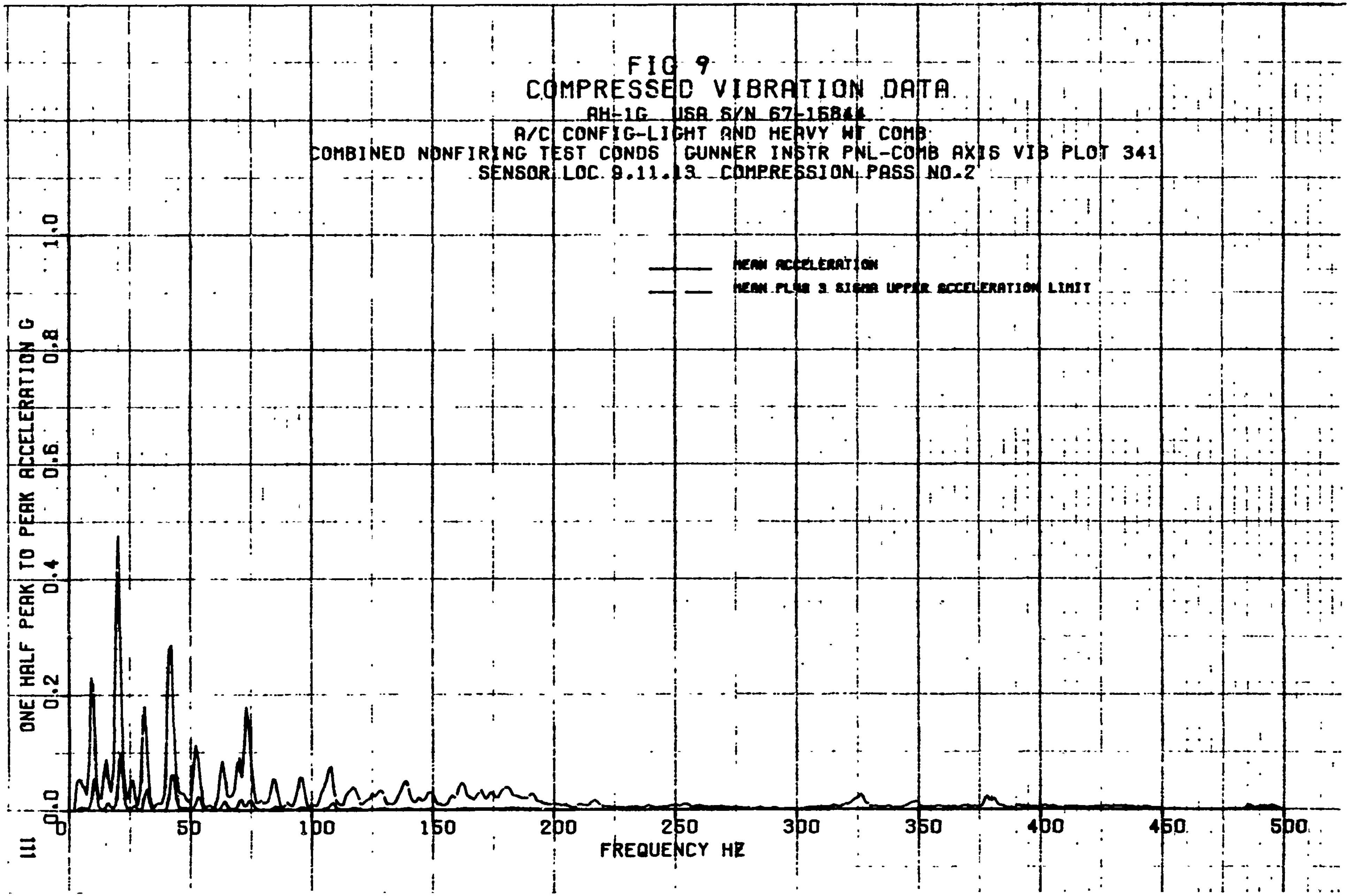


FIG 9
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS GUNNER INSTR PNL-COMB AXIS VIB PLOT 341
SENSOR LOC 9.11.13 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 10

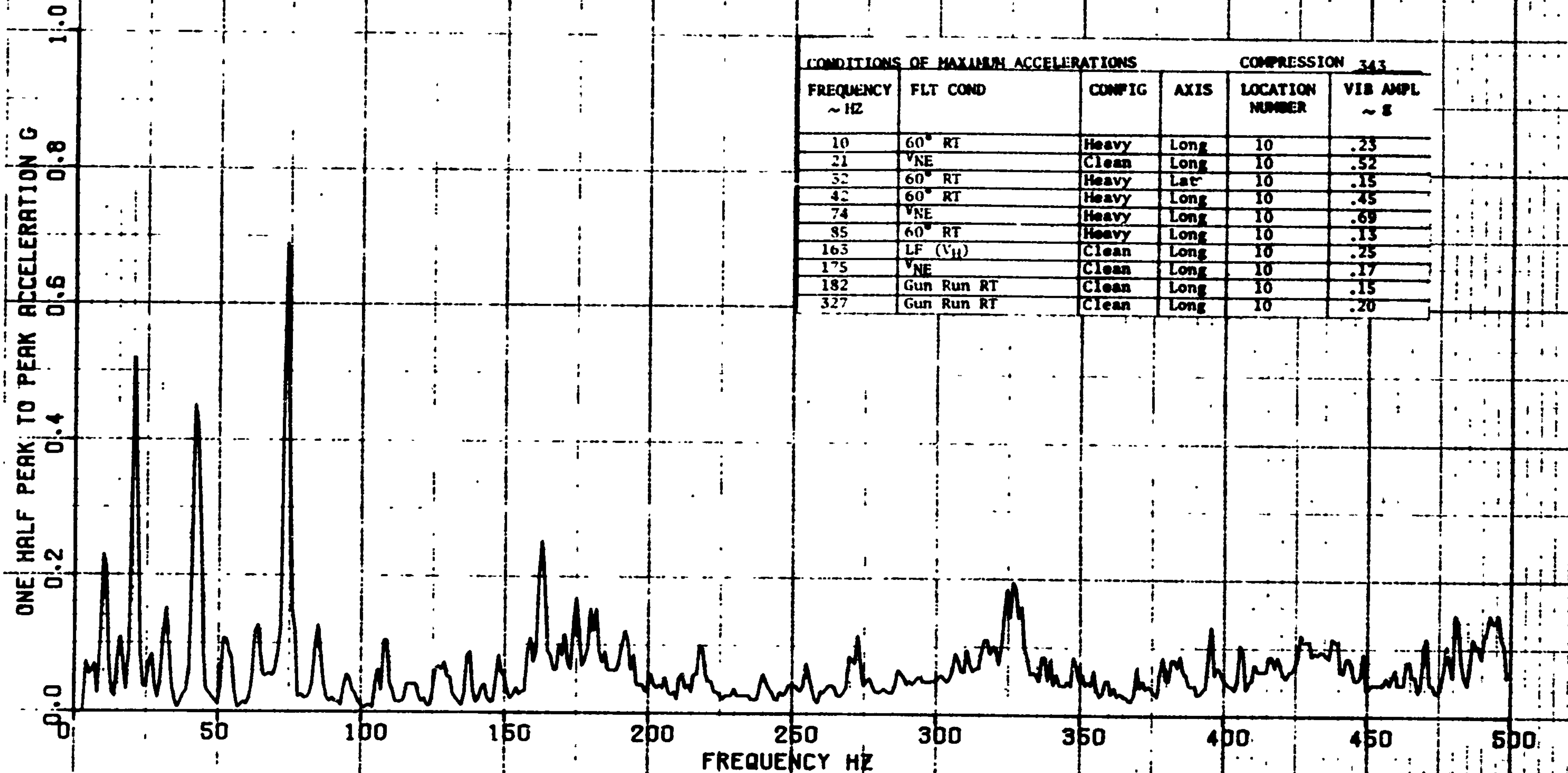
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMBINED NONFIRING TEST CONDS GUNNER PNL STRCT-COMB AXIS VIB PLOT 343

SENSOR LOC 10.12 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 343

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
10	60° RT	Heavy	Long	10	.23
21	V_{NE}	Clean	Long	10	.52
32	60° RT	Heavy	Lat	10	.15
42	60° RT	Heavy	Long	10	.45
74	V_{NE}	Heavy	Long	10	.69
85	60° RT	Heavy	Long	10	.13
163	LF (V_H)	Clean	Long	10	.25
175	V_{NE}	Clean	Long	10	.17
182	Gun Run RT	Clean	Long	10	.15
327	Gun Run RT	Clean	Long	10	.20

FIG 11

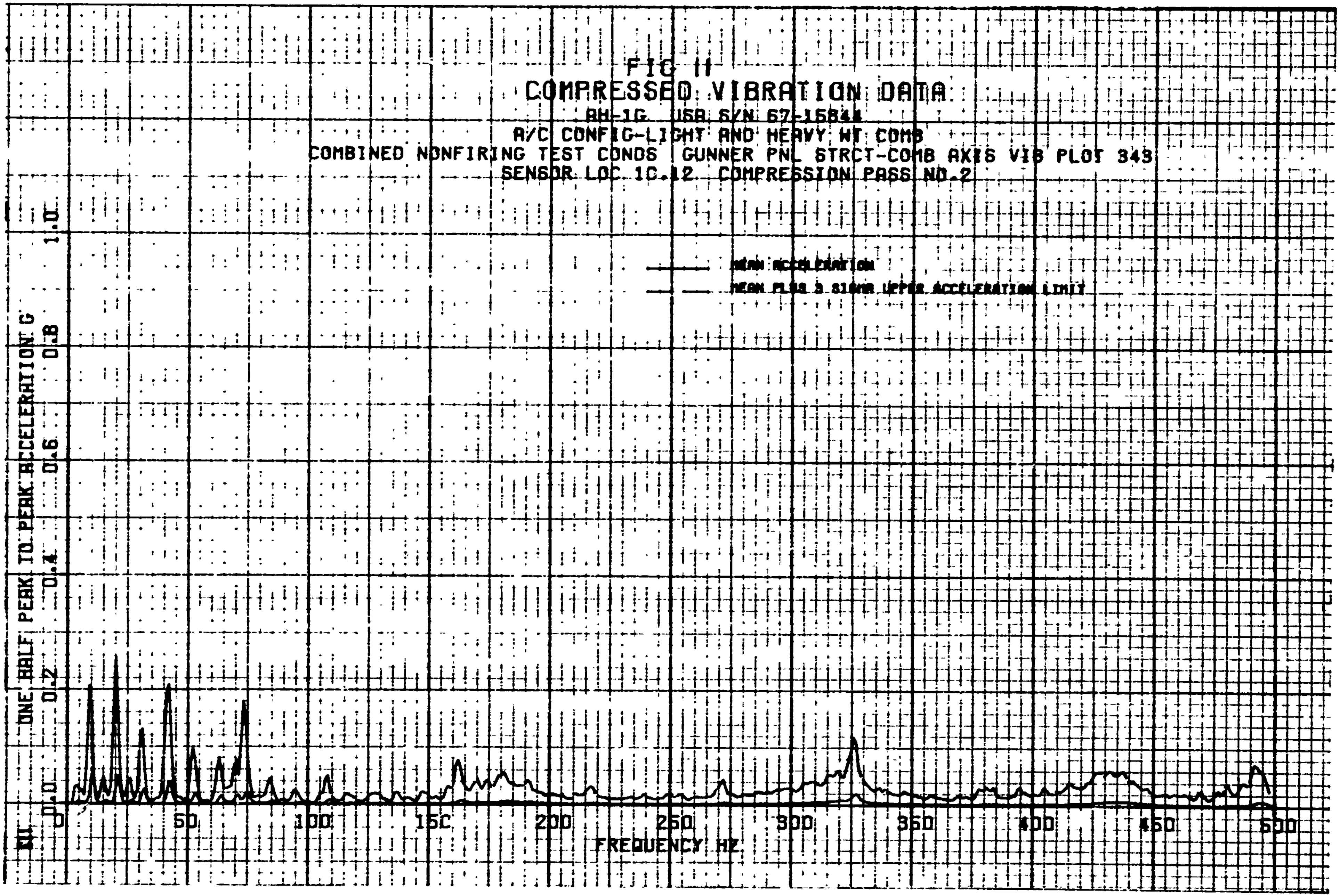

COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS GUNNER PNL STRCT-COMB AXIS VIB PLOT 343
SENSOR LOC 1C.12 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 12

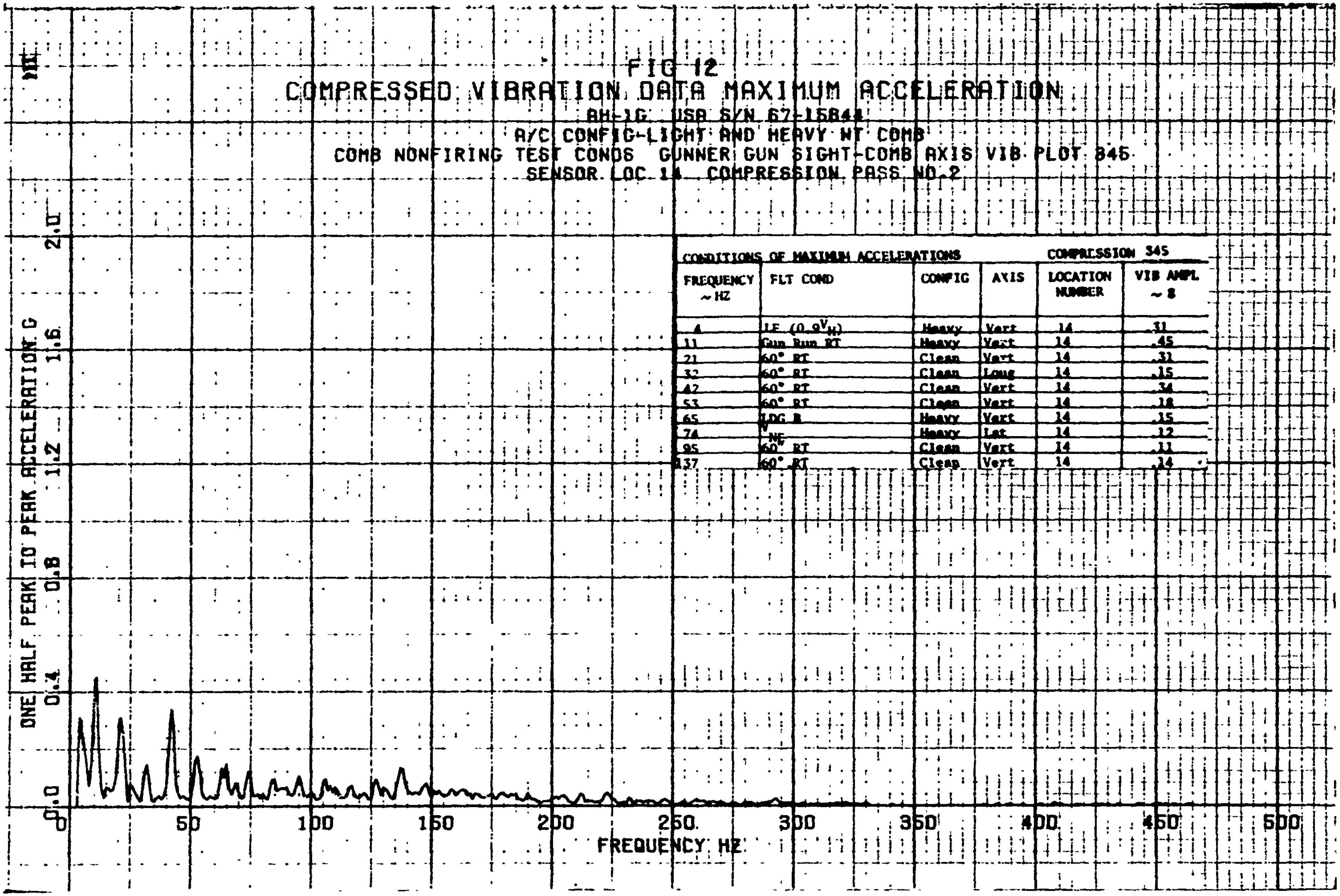
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB NONFIRING TEST CONDS GUNNER GUN SIGHT-COMB AXIS VIB PLOT 345

SENSOR LOC 14 COMPRESSION PASS NO 2



CONDITIONS OF MAXIMUM ACCELERATIONS				COMPRESSION 345	
FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
4	LF (0.9V_H)	Heavy	Vert	14	.31
11	Gun Run RT	Heavy	Vert	14	.45
21	60° RT	Clean	Vert	14	.31
32	60° RT	Clean	Long	14	.15
42	60° RT	Clean	Vert	14	.34
53	60° RT	Clean	Vert	14	.18
65	LDG R	Heavy	Vert	14	.15
74	V_{NE}	Heavy	Lat	14	.12
95	60° RT	Clean	Vert	14	.11
137	60° RT	Clean	Vert	14	.14

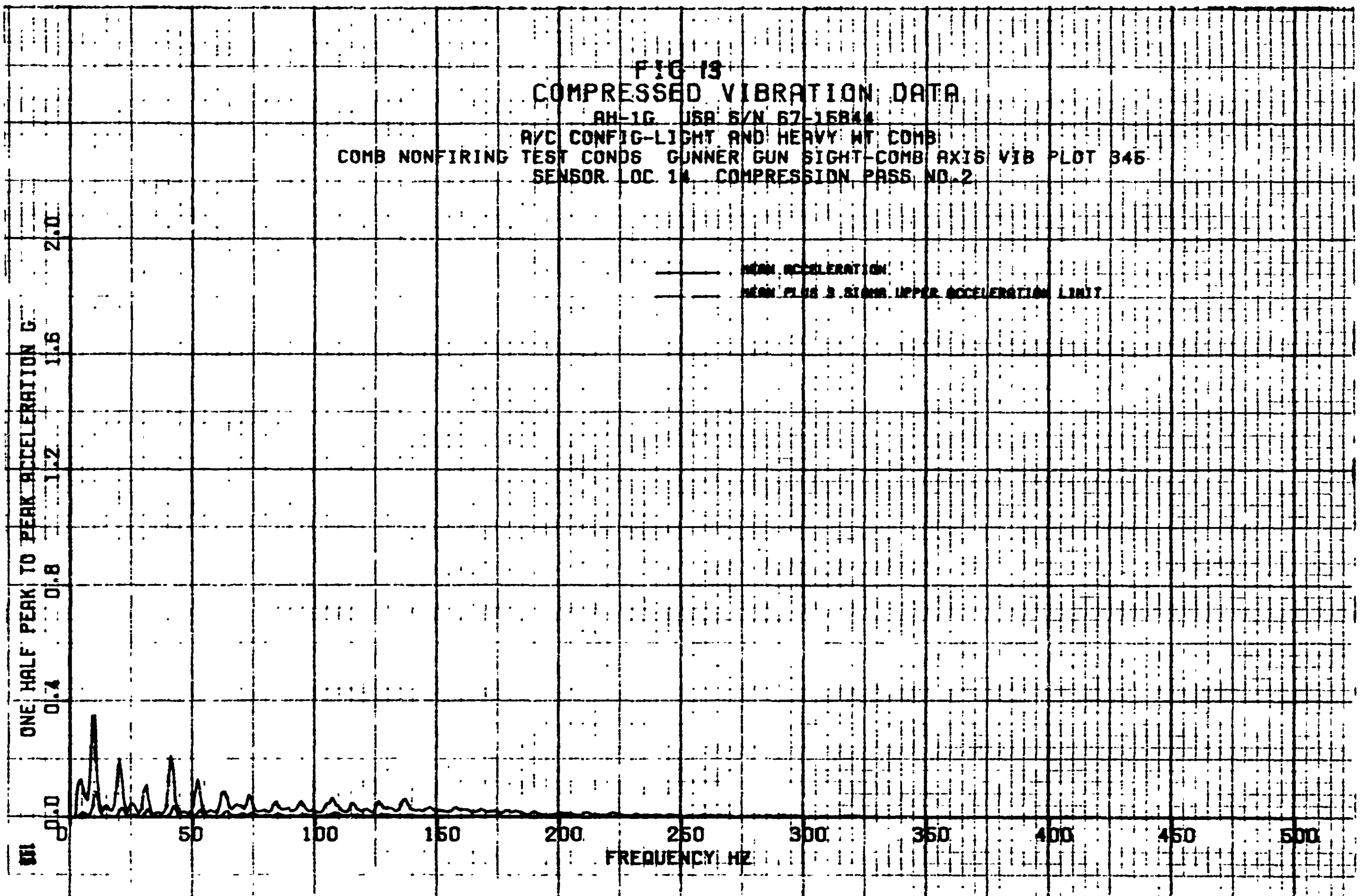


FIG 13
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB NONFIRING TEST CONDS GUNNER GUN SIGHT-COMB AXIS VIB PLOT 345
SENSOR LOC 14 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 14

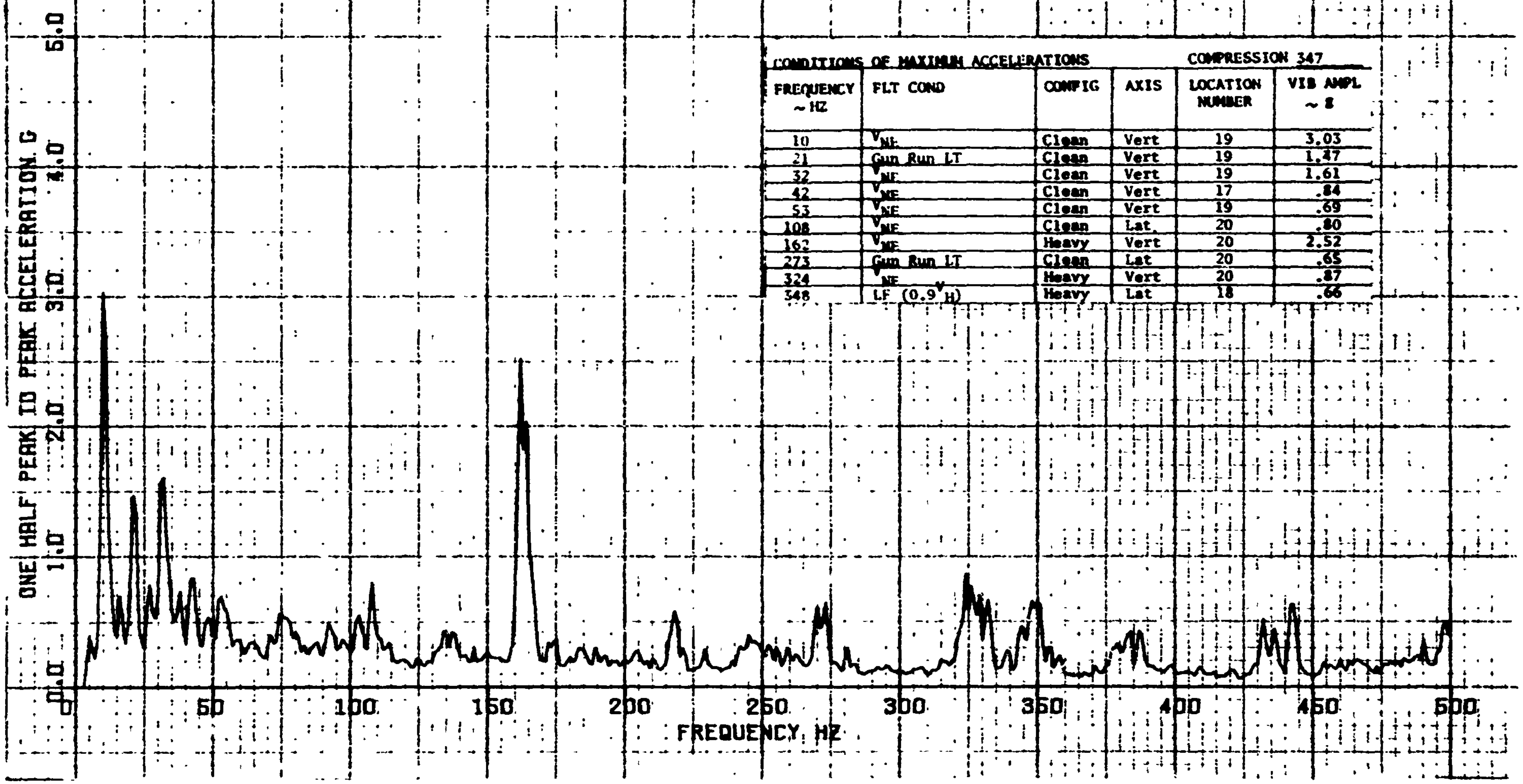
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMBINED NONFIRING TEST CONDS AVIONICS EQUIP-COMB AXIS VIB PLOT 347

SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 347

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
10	V_{NE}	Clean	Vert	19	3.03
21	Gun Run LT	Clean	Vert	19	1.47
32	V_{NE}	Clean	Vert	19	1.61
42	V_{NE}	Clean	Vert	17	.84
53	V_{NE}	Clean	Vert	19	.69
108	V_{NE}	Clean	Lat	20	.80
162	V_{NE}	Heavy	Vert	20	2.52
273	Gun Run LT	Clean	Lat	20	.65
324	V_{NE}	Heavy	Vert	20	.87
348	LF $(0.9V_H)$	Heavy	Lat	18	.66

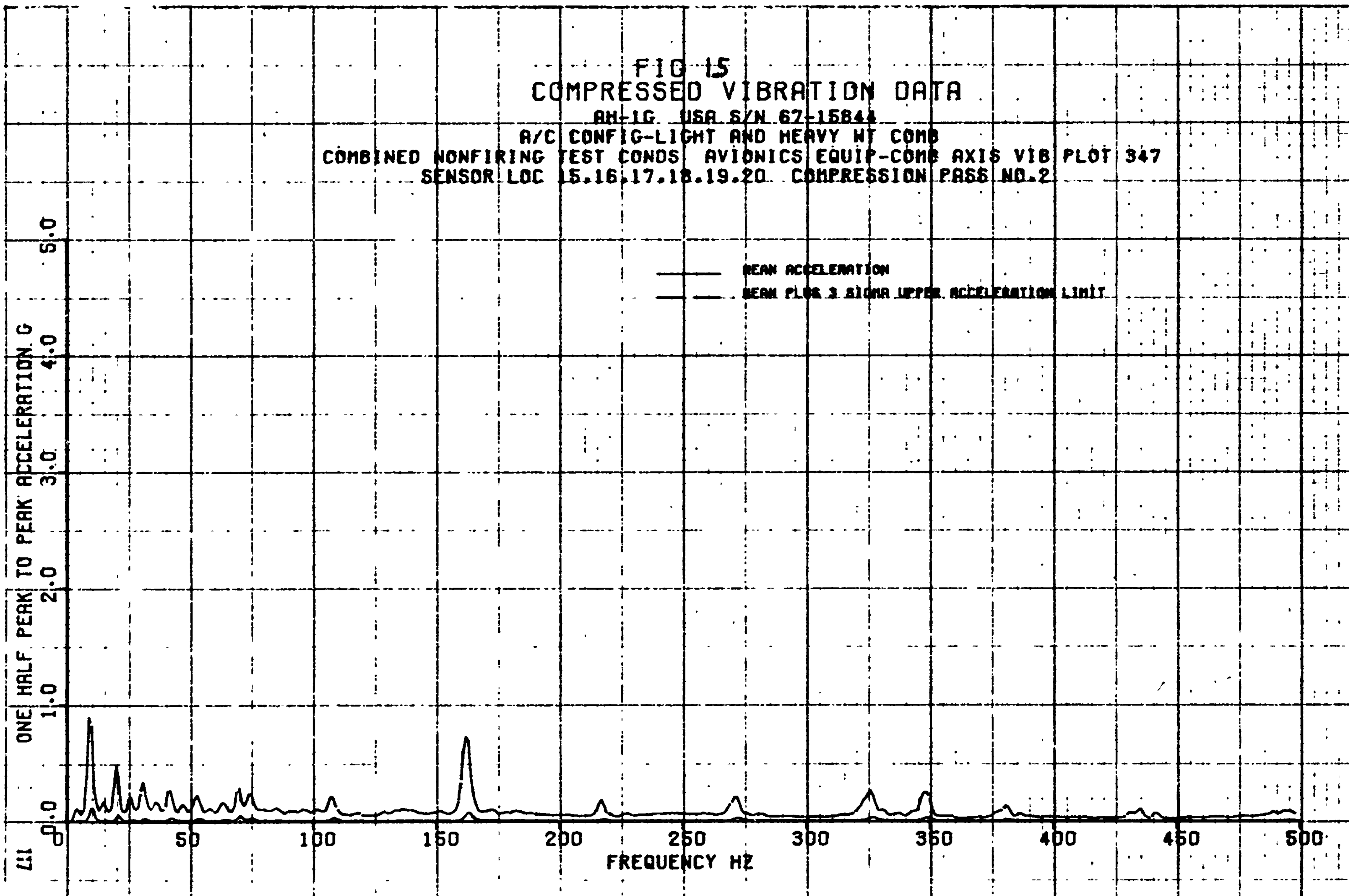


FIG 15
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS AVIONICS EQUIP-COMB AXIS VIB PLOT 347
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.2

FIG 16

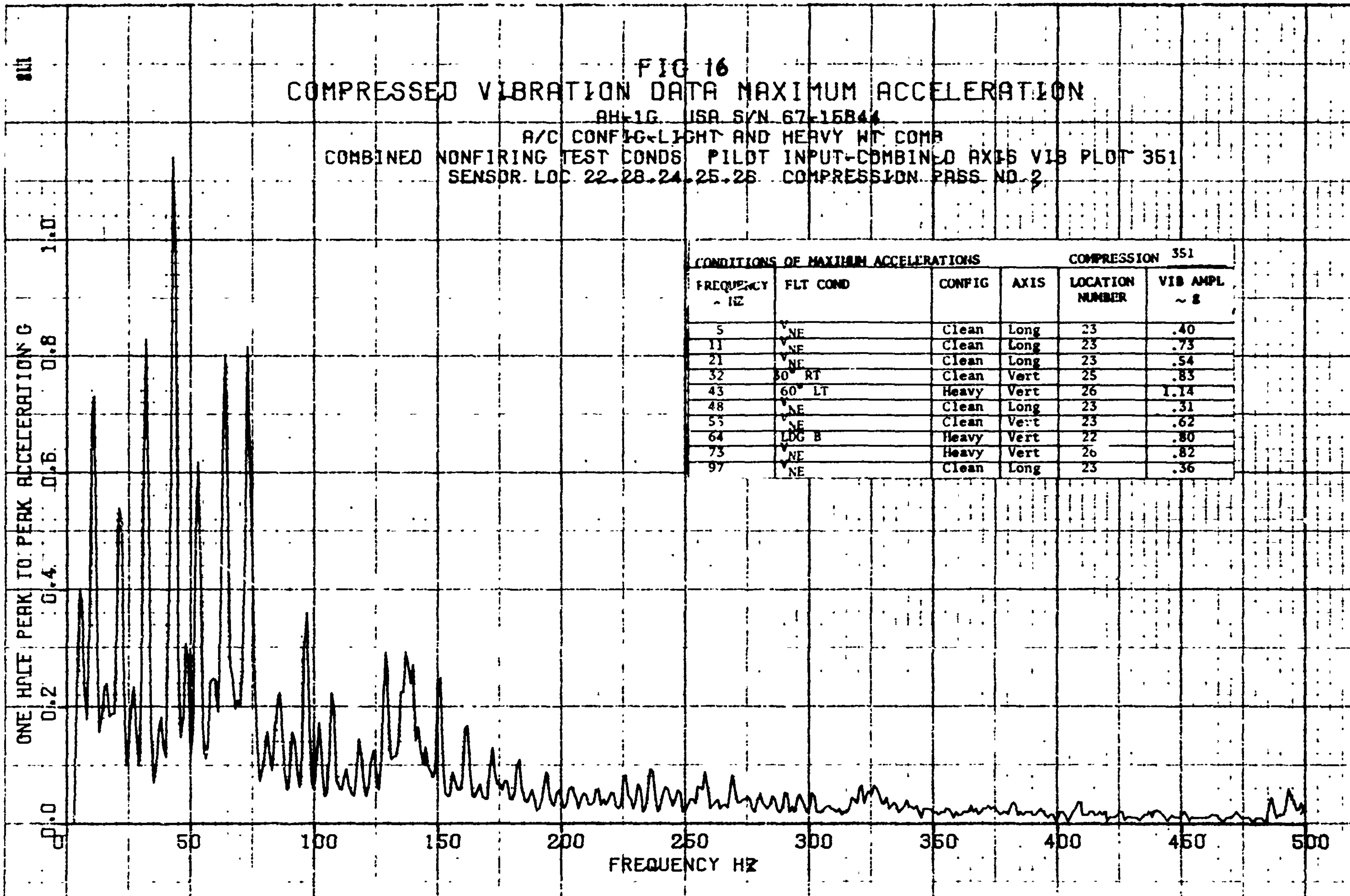
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMBINED NONFIRING TEST CONDS PILOT INPUT-COMBINED AXIS VIB PLOT 351

SENSOR LOC 22.28.24.25.26 COMPRESSION PASS NO 2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 351

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
5	V_{NE}	Clean	Long	23	.40
11	V_{NE}	Clean	Long	23	.73
21	V_{NE}	Clean	Long	23	.54
32	30° RT	Clean	Vert	25	.83
43	60° LT	Heavy	Vert	26	1.14
48	V_{NE}	Clean	Long	23	.31
55	V_{NE}	Clean	Vert	23	.62
64	LDG B	Heavy	Vert	22	.80
73	V_{NE}	Heavy	Vert	26	.82
97	V_{NE}	Clean	Long	23	.36

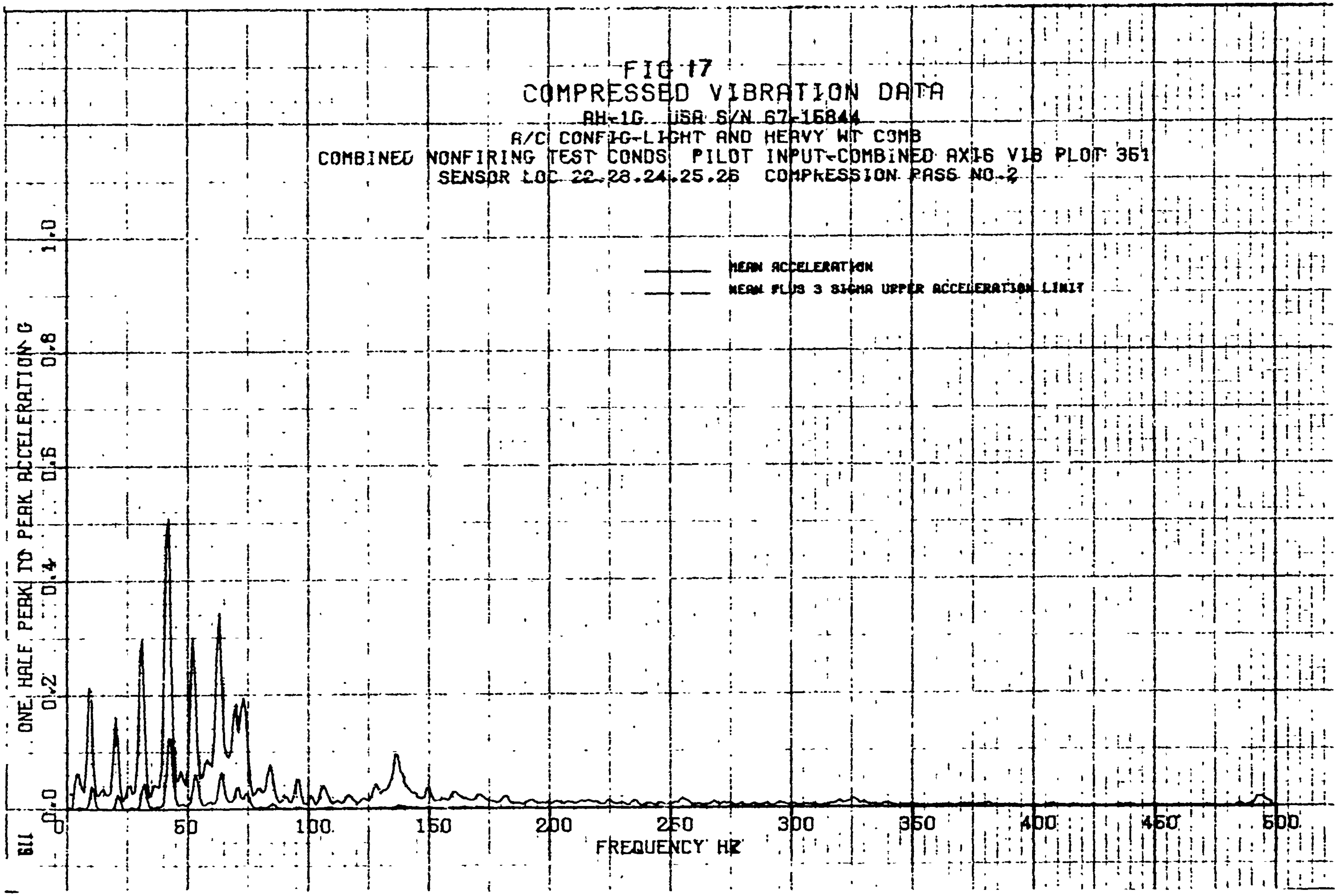


FIG 17
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS PILOT INPUT-COMBINED AXIS VIB PLOT 351
SENSOR LOC 22.28.24.25.26 COMPRESSION PASS NO. 2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 18

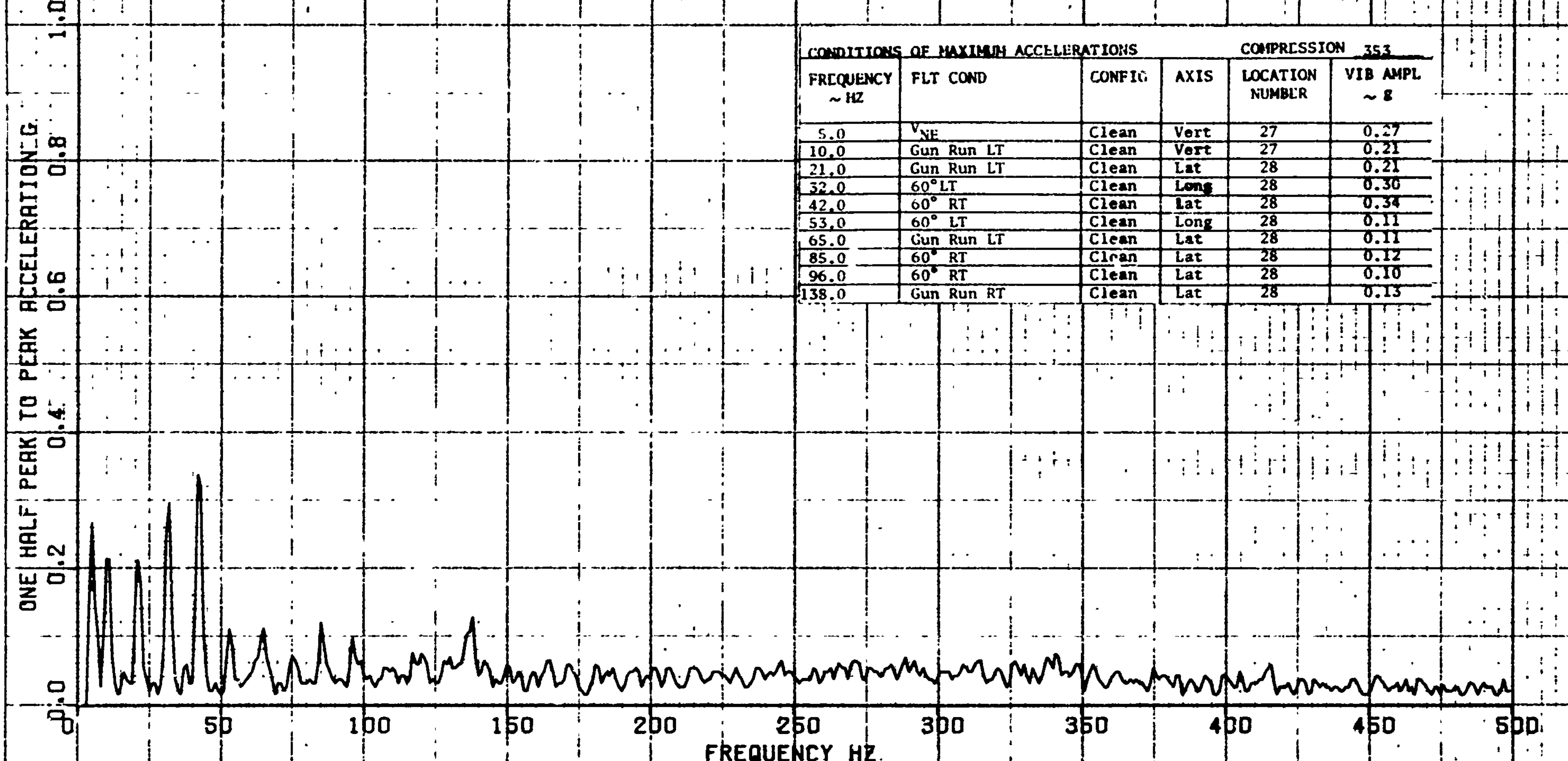
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY NT COMB

COMBINED NONFIRING TEST CONDS PILOT OUTPUT-COMBINED AXIS VIB PLOT 353

SENSOR LOC 27.28 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 353

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
5.0	V_{NE}	Clean	Vert	27	0.27
10.0	Gun Run LT	Clean	Vert	27	0.21
21.0	Gun Run LT	Clean	Lat	28	0.21
32.0	60°LT	Clean	Long	28	0.30
42.0	60° RT	Clean	Lat	28	0.34
53.0	60° LT	Clean	Long	28	0.11
65.0	Gun Run LT	Clean	Lat	28	0.11
85.0	60° RT	Clean	Lat	28	0.12
96.0	60° RT	Clean	Lat	28	0.10
138.0	Gun Run RT	Clean	Lat	28	0.13

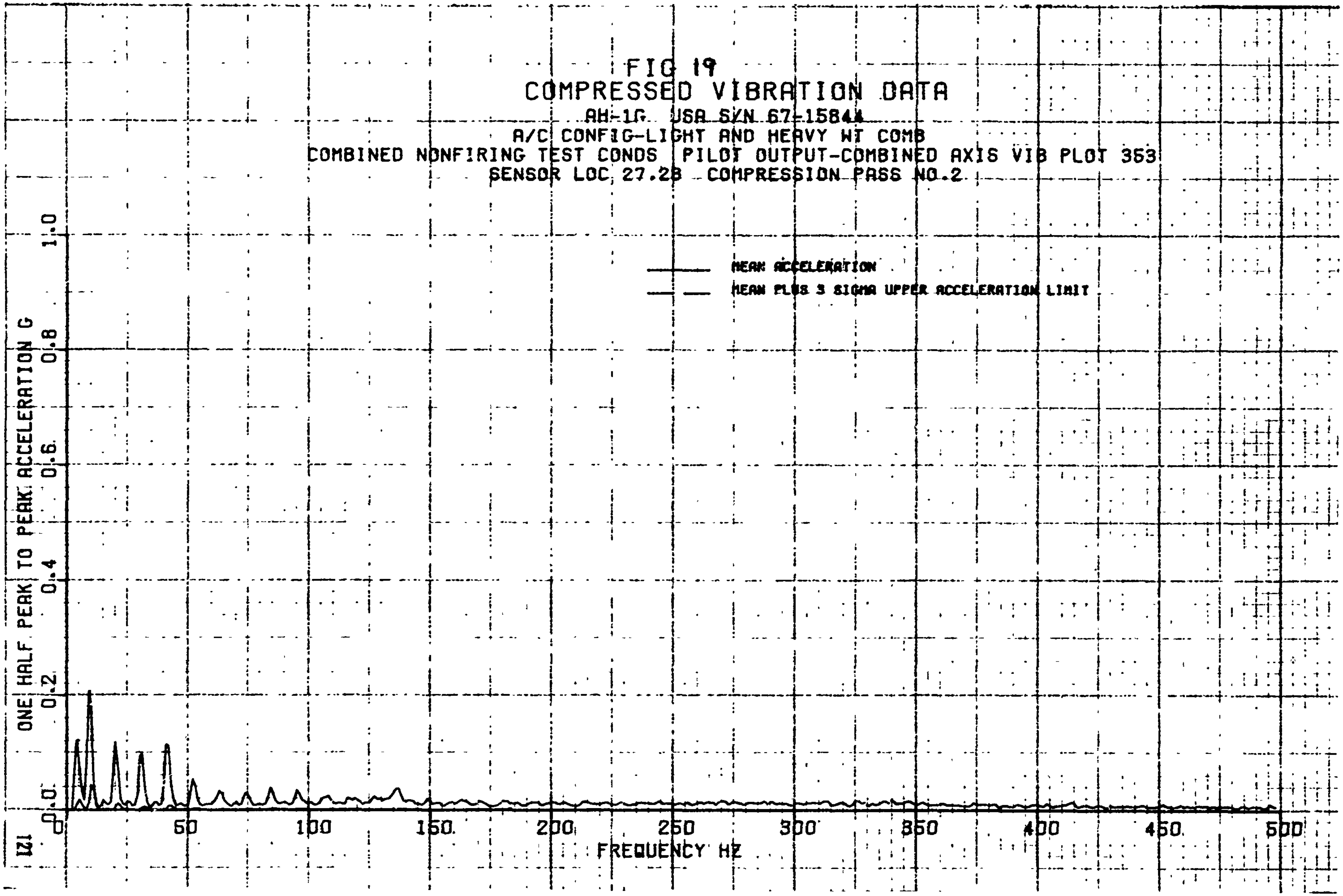


FIG 19
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS PILOT OUTPUT-COMBINED AXIS VIB PLOT 353
SENSOR LOC 27.2B COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 20

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

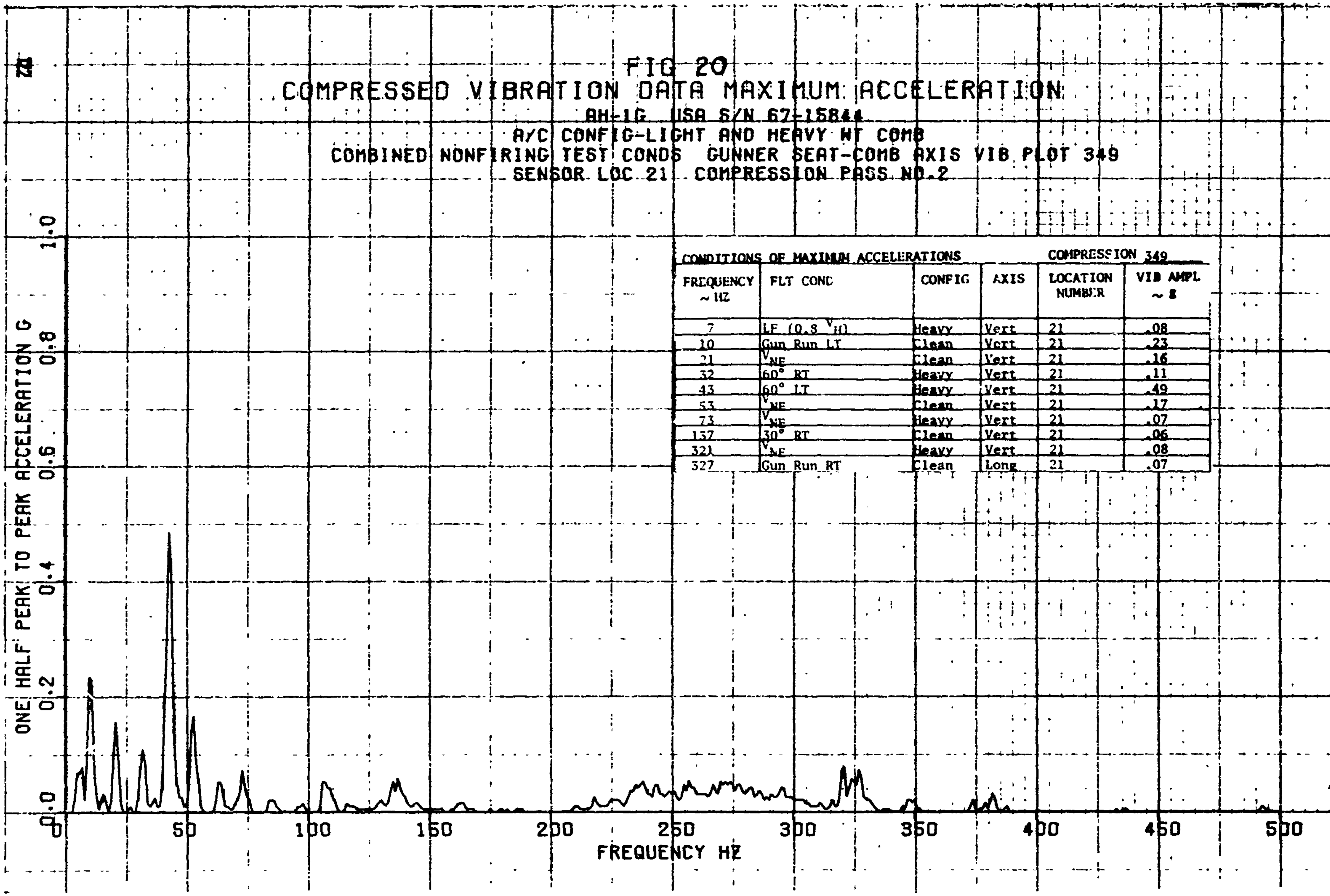
A/C CONFIG-LIGHT AND HEAVY WT COMB

COMBINED NONFIRING TEST CONDS GUNNER SEAT-COMB AXIS VIB PLOT 349

SENSOR LOC 21 COMPRESSION PASS NO.2

CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 349

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
7	LF (0.8 V_H)	Heavy	Vert	21	.08
10	Gun Run LT	Clean	Vert	21	.23
21	V_{NE}	Clean	Vert	21	.16
32	60° RT	Heavy	Vert	21	.11
43	60° LT	Heavy	Vert	21	.49
53	V_{NE}	Clean	Vert	21	.17
73	V_{NE}	Heavy	Vert	21	.07
137	30° RT	Clean	Vert	21	.06
321	V_{NE}	Heavy	Vert	21	.08
327	Gun Run RT	Clean	Long	21	.07



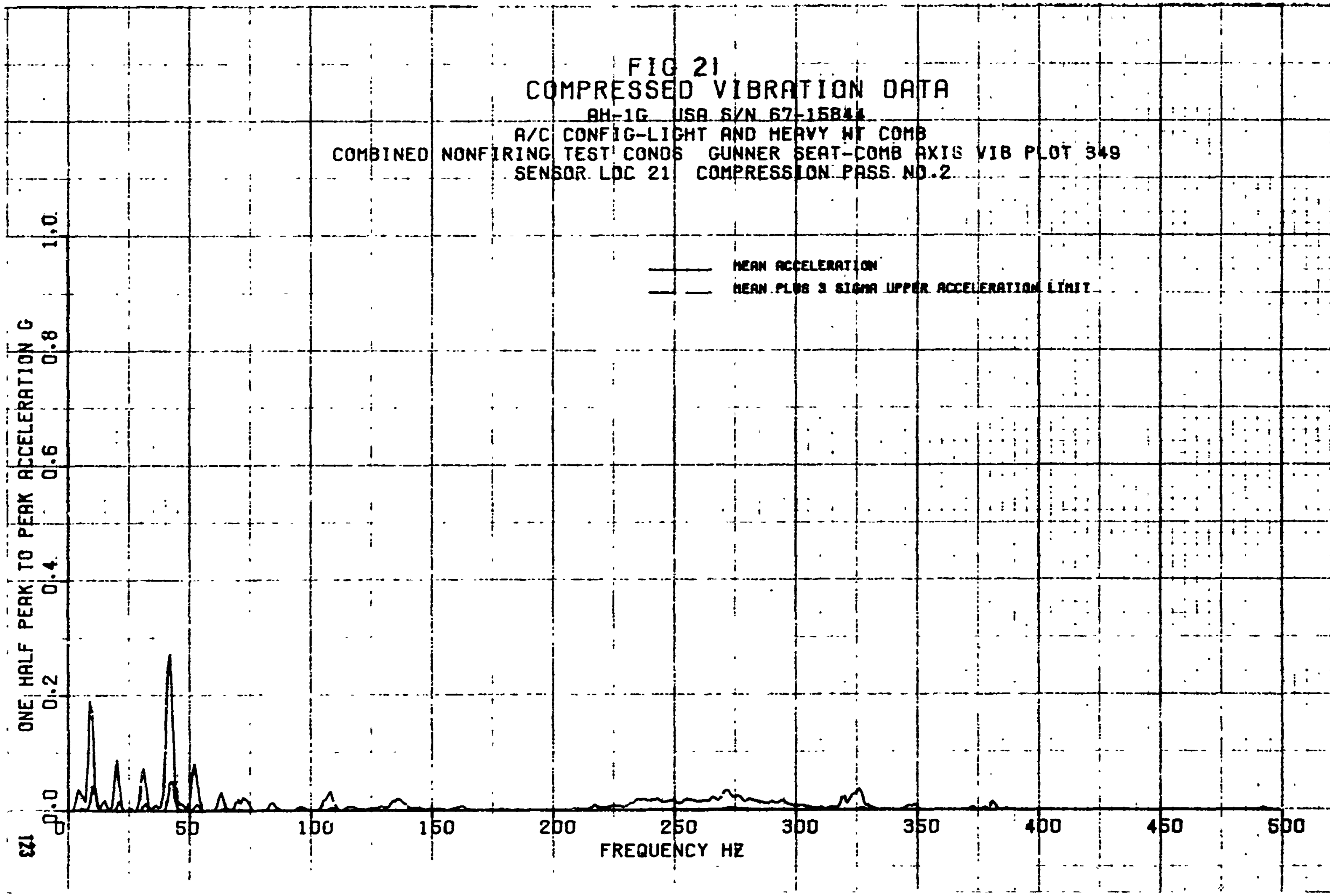
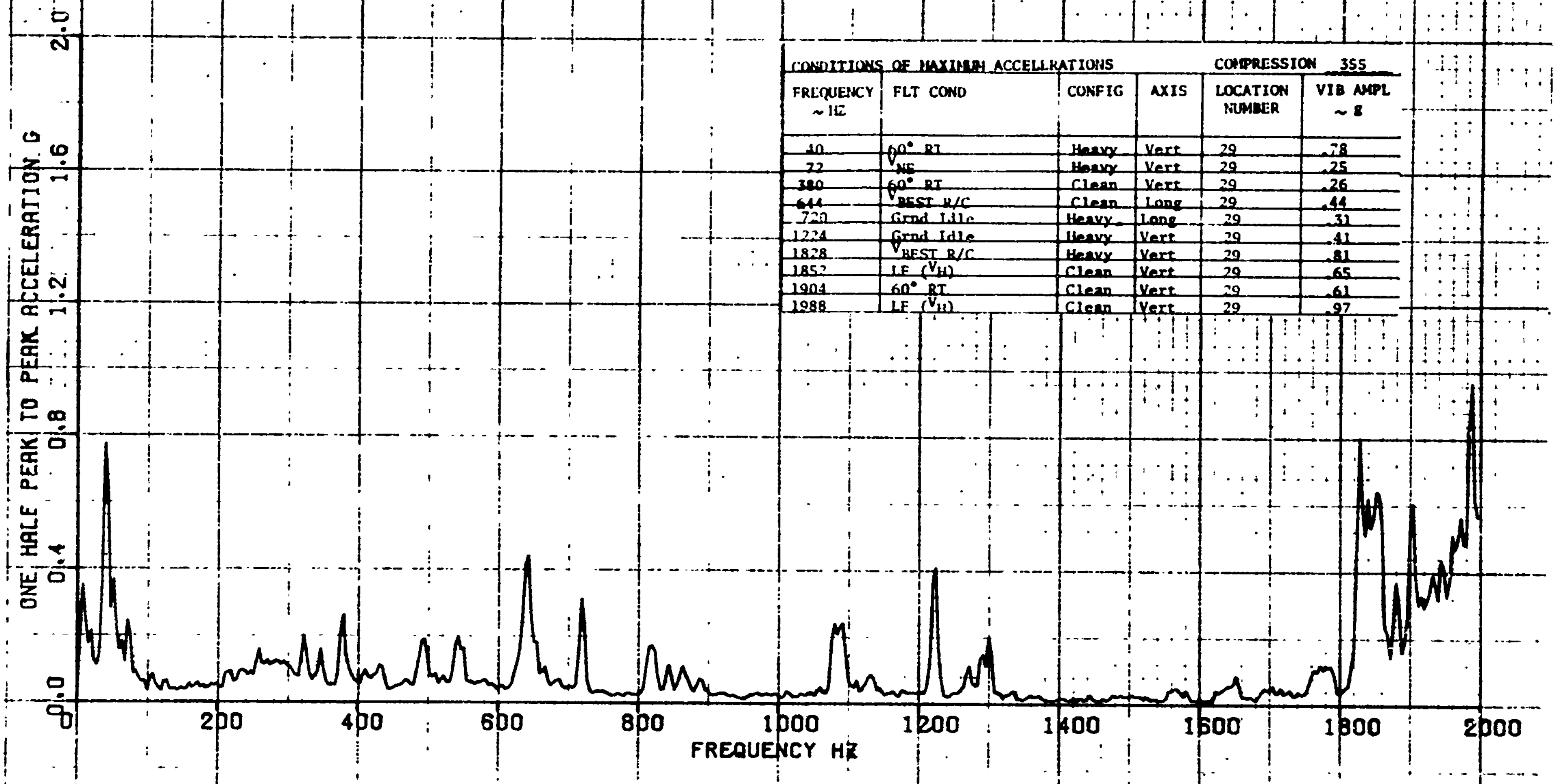


FIG 21
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS GUNNER SEAT-COMB AXIS VIB PLOT 349
SENSOR LOC 21 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 22
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS LIFT LINK-COMBINED AXIS VIB PLOT 855
SENSOR LOC 29 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELLRATIONS — COMPRESSION 355

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
40	60° RT	Heavy	Vert	29	.78
72	V_{NE}	Heavy	Vert	29	.25
380	60° RT	Clean	Vert	29	.26
644	$V_{BEST\ R/C}$	Clean	Long	29	.44
720	Grnd Idle	Heavy	Long	29	.31
1224	Grnd Idle	Heavy	Vert	29	.41
1828	$V_{BEST\ R/C}$	Heavy	Vert	29	.81
1852	LF (V_H)	Clean	Vert	29	.65
1904	60° RT	Clean	Vert	29	.61
1988	LF (V_H)	Clean	Vert	29	.97

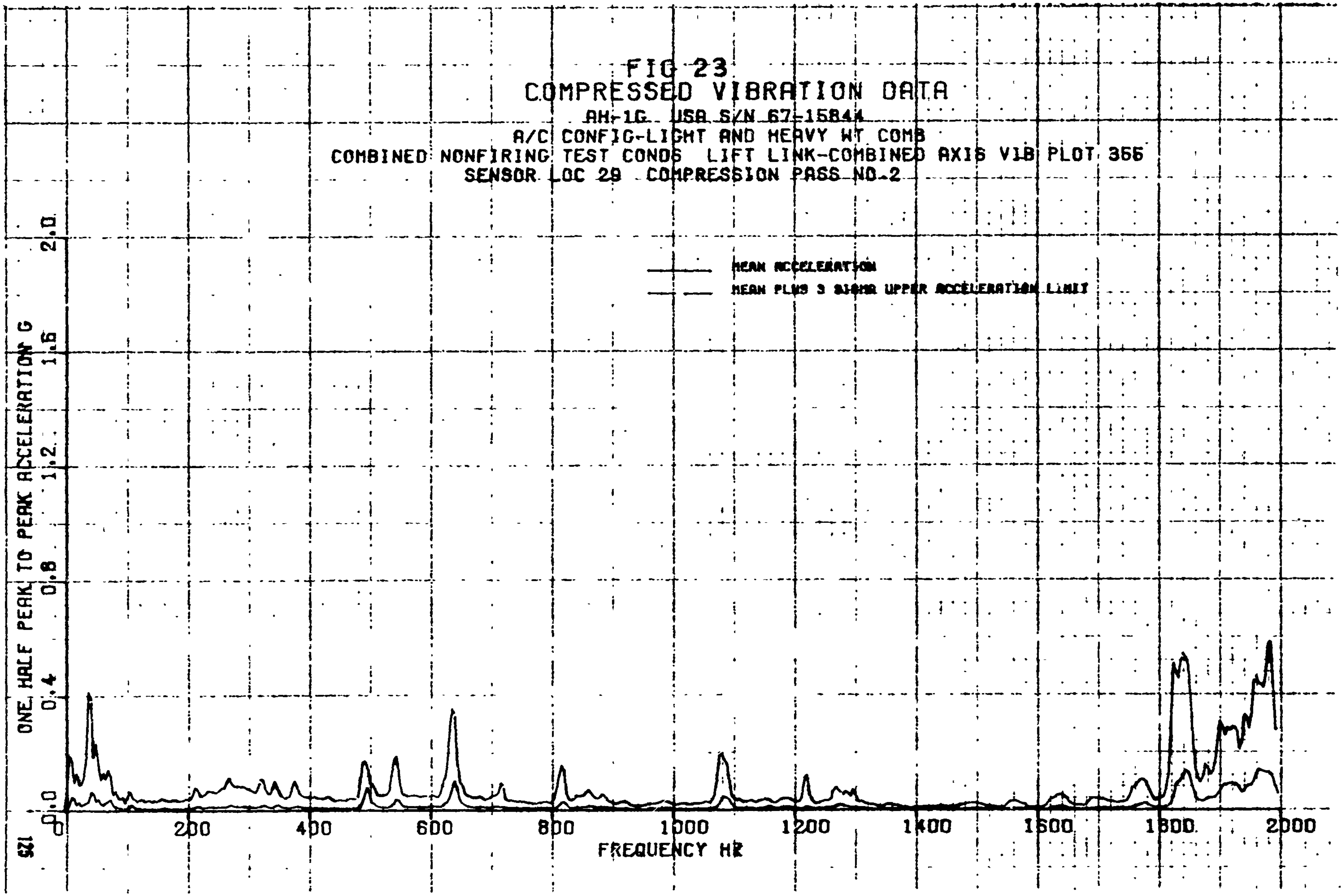
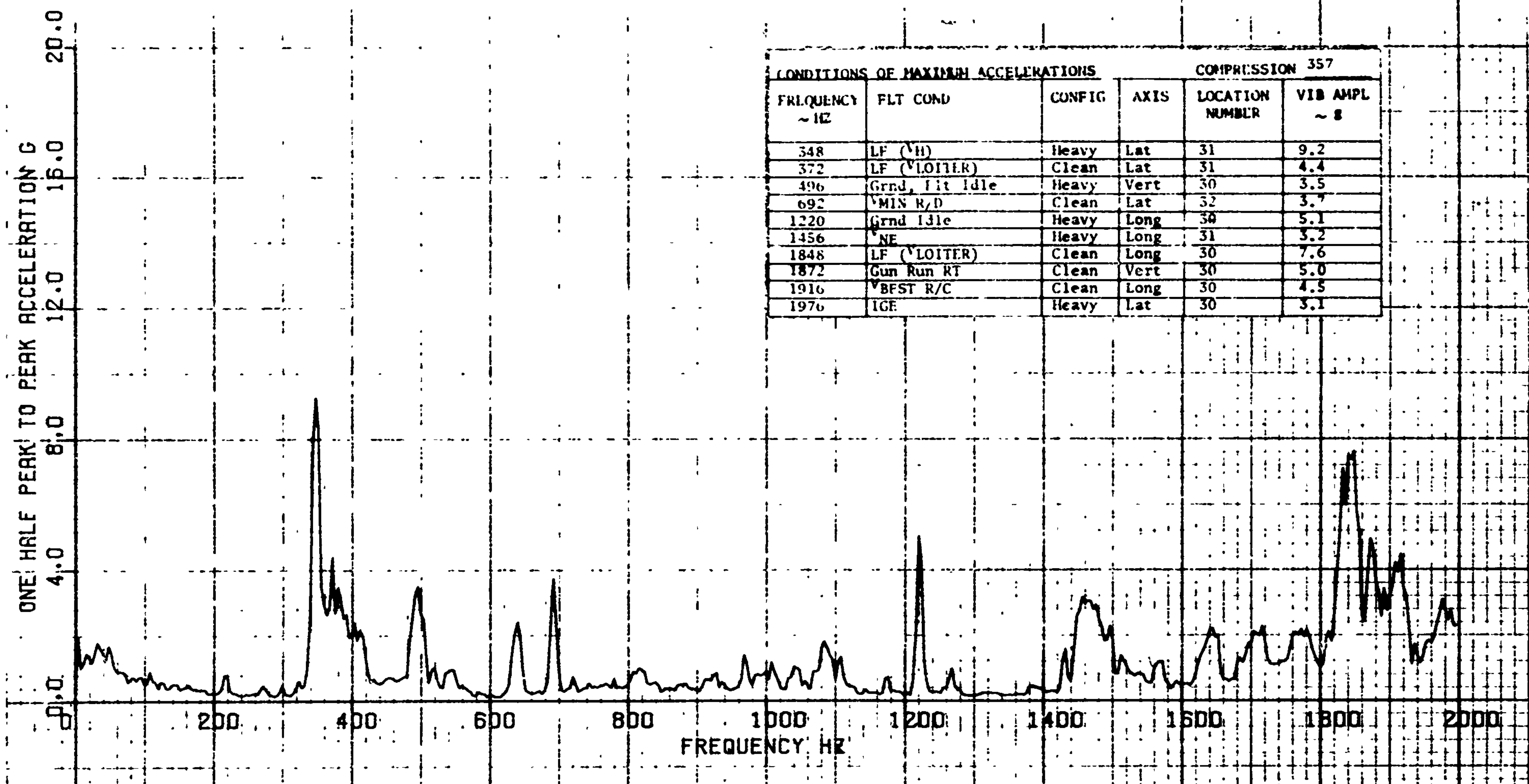


FIG 23
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS LIFT LINK-COMBINED AXIS VIB PLOT 355
SENSOR LOC 29 COMPRESSION PASS NO-2

FIG 24
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB NONFIRING TEST CONDS NR,N1,N2 TACH GENERATORS-COMB AXIS VIB PLOT 357
SENSOR LOC 30,31,32 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 357

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
348	LF (V_H)	Heavy	Lat	31	9.2
372	LF (V_{LOITER})	Clean	Lat	31	4.4
496	Grnd, Flt Idle	Heavy	Vert	30	3.5
692	V_{MIN} R/D	Clean	Lat	32	3.7
1220	Grnd Idle	Heavy	Long	30	5.1
1456	V_{NE}	Heavy	Long	31	3.2
1848	LF (V_{LOITER})	Clean	Long	30	7.6
1872	Gun Run RT	Clean	Vert	30	5.0
1916	V_{BEST} R/C	Clean	Long	30	4.5
1976	IGE	Heavy	Lat	30	3.1

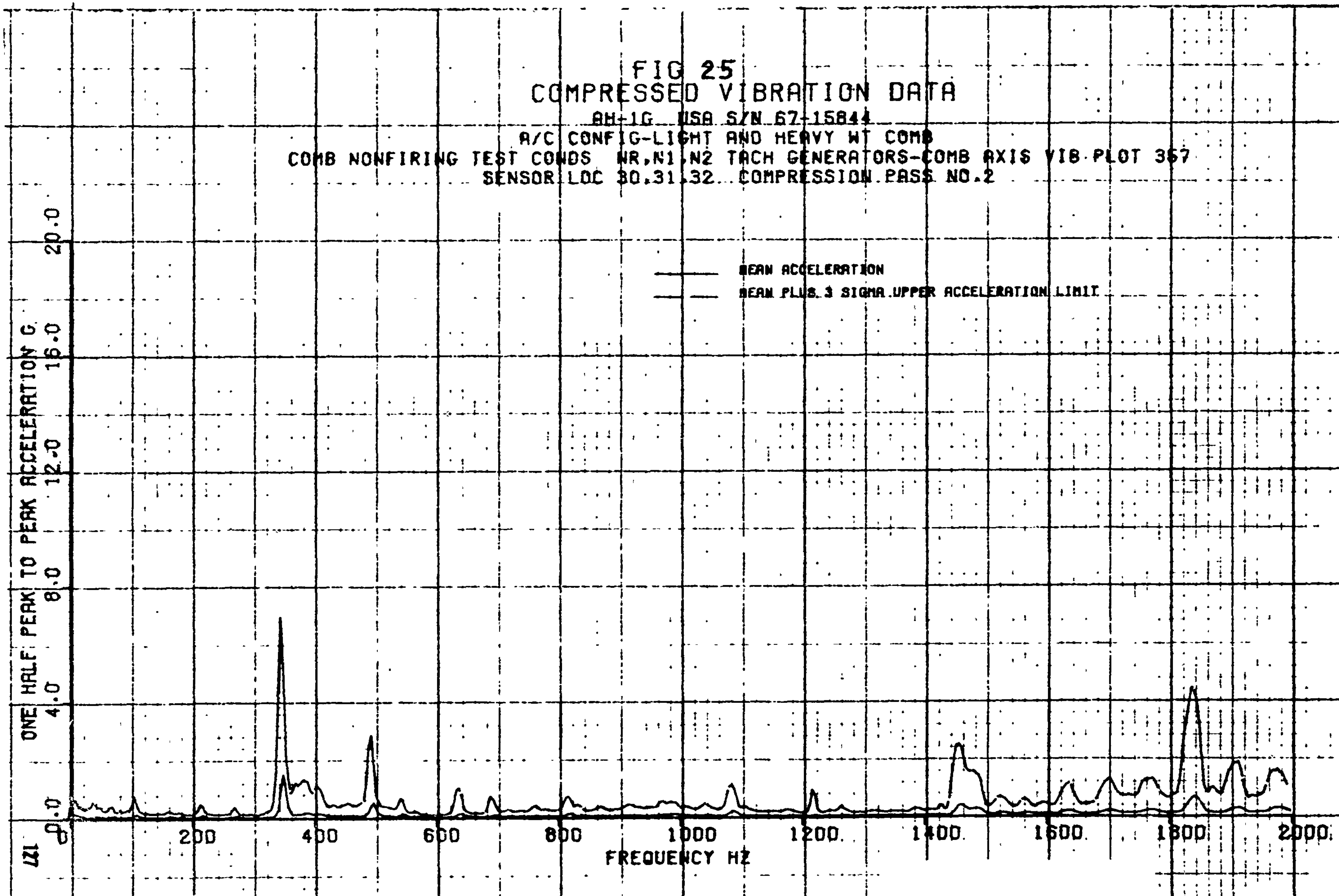
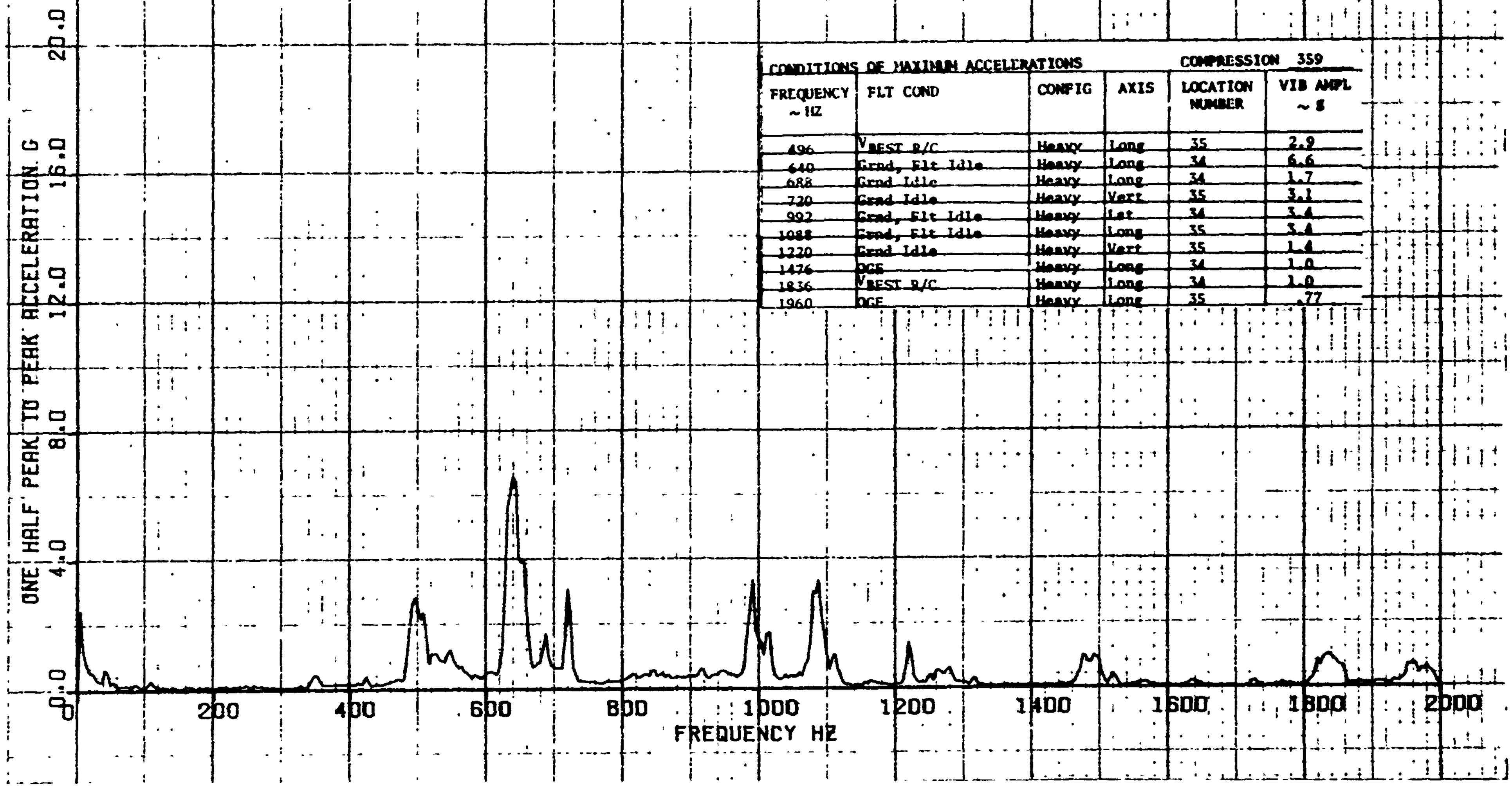


FIG 25
COMPRESSED VIBRATION DATA

FIG 26
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS TRANS MOUNTS-COMB AXIS VIB PLOT 869
SENSOR LOC 33.34.35.36 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 359

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
496	V_{BEST} R/C	Heavy	Long	35	2.9
640	Grnd, Flt Idle	Heavy	Long	34	6.6
688	Grnd Idle	Heavy	Long	34	1.7
720	Grnd Idle	Heavy	Vert	35	3.1
992	Grnd, Flt Idle	Heavy	Lat	34	3.4
1088	Grnd, Flt Idle	Heavy	Long	35	3.4
1220	Grnd Idle	Heavy	Vert	35	1.4
1476	OGE	Heavy	Long	34	1.0
1836	V_{BEST} R/C	Heavy	Long	34	1.0
1960	OGE	Heavy	Long	35	.77

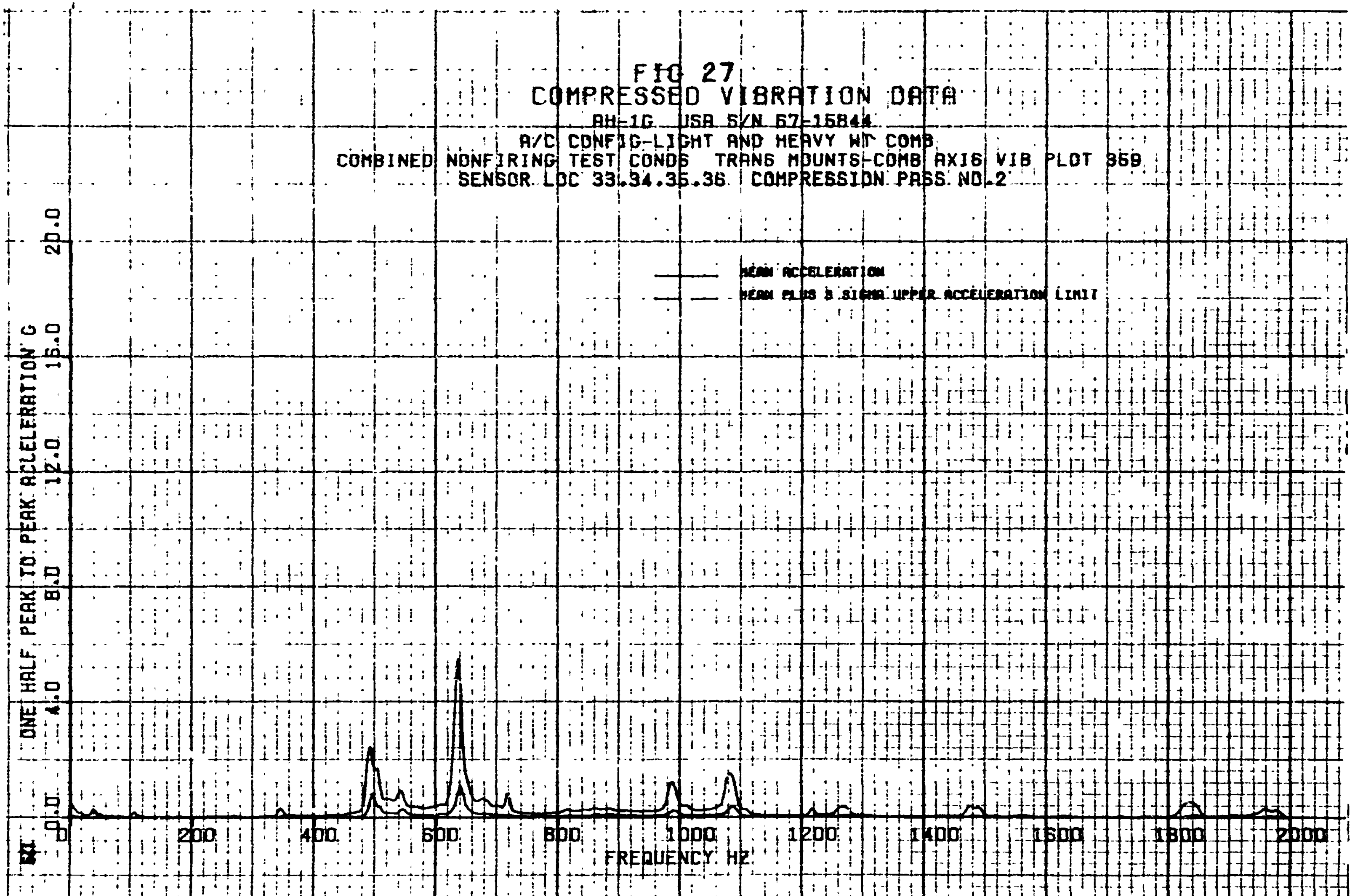


FIG 27
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS TRANS MOUNTS-COMB AXIS VIB PLOT 359
SENSOR LOC 33.34.35.36 COMPRESSION PASS NO 2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
4.0
8.0
12.0
16.0
20.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 28

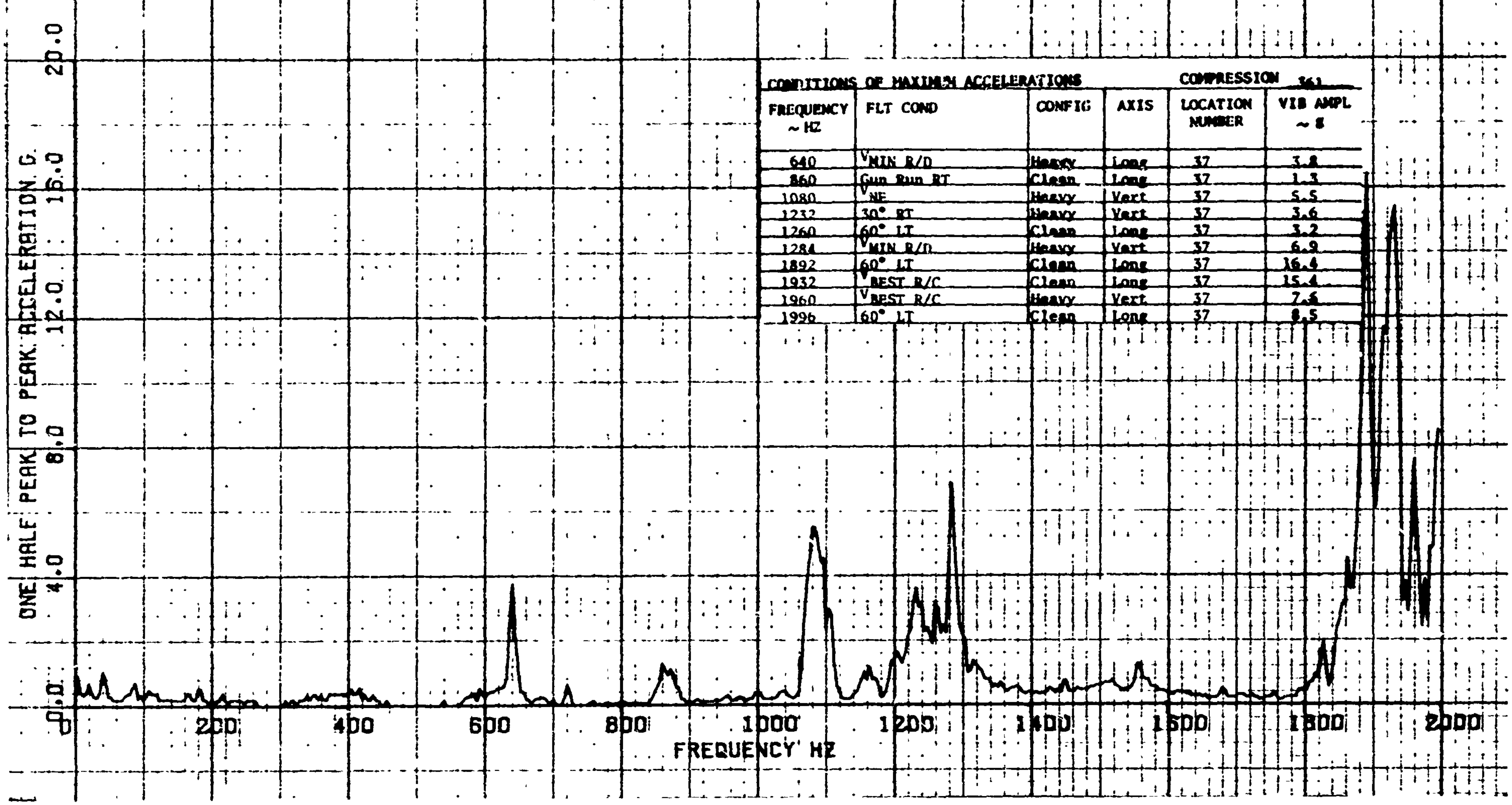
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMBINED NONFIRING TEST CONDS TRANS CASE-COMB AXIS VIB PLOT 861

SENSOR LOC 37 COMPRESSION PASS NO 2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 861

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
640	V_{MIN} R/D	Heavy	Long	37	3.8
860	Gun Run RT	Clean	Long	37	1.3
1080	V_{NE}	Heavy	Vert	37	5.5
1232	30° RT	Heavy	Vert	37	3.6
1260	60° LT	Clean	Long	37	3.2
1284	V_{MIN} R/D	Heavy	Vert	37	6.9
1892	60° LT	Clean	Long	37	16.4
1932	V_{BEST} R/C	Clean	Long	37	15.4
1960	V_{BEST} R/C	Heavy	Vert	37	7.6
1996	60° LT	Clean	Long	37	8.5

FIG 29

COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMBINED NONFIRING TEST CONDS TRANS CASE-COMB AXIS VIB PLOT 361

SENSOR LOC 37 COMPRESSION PASS NO 2

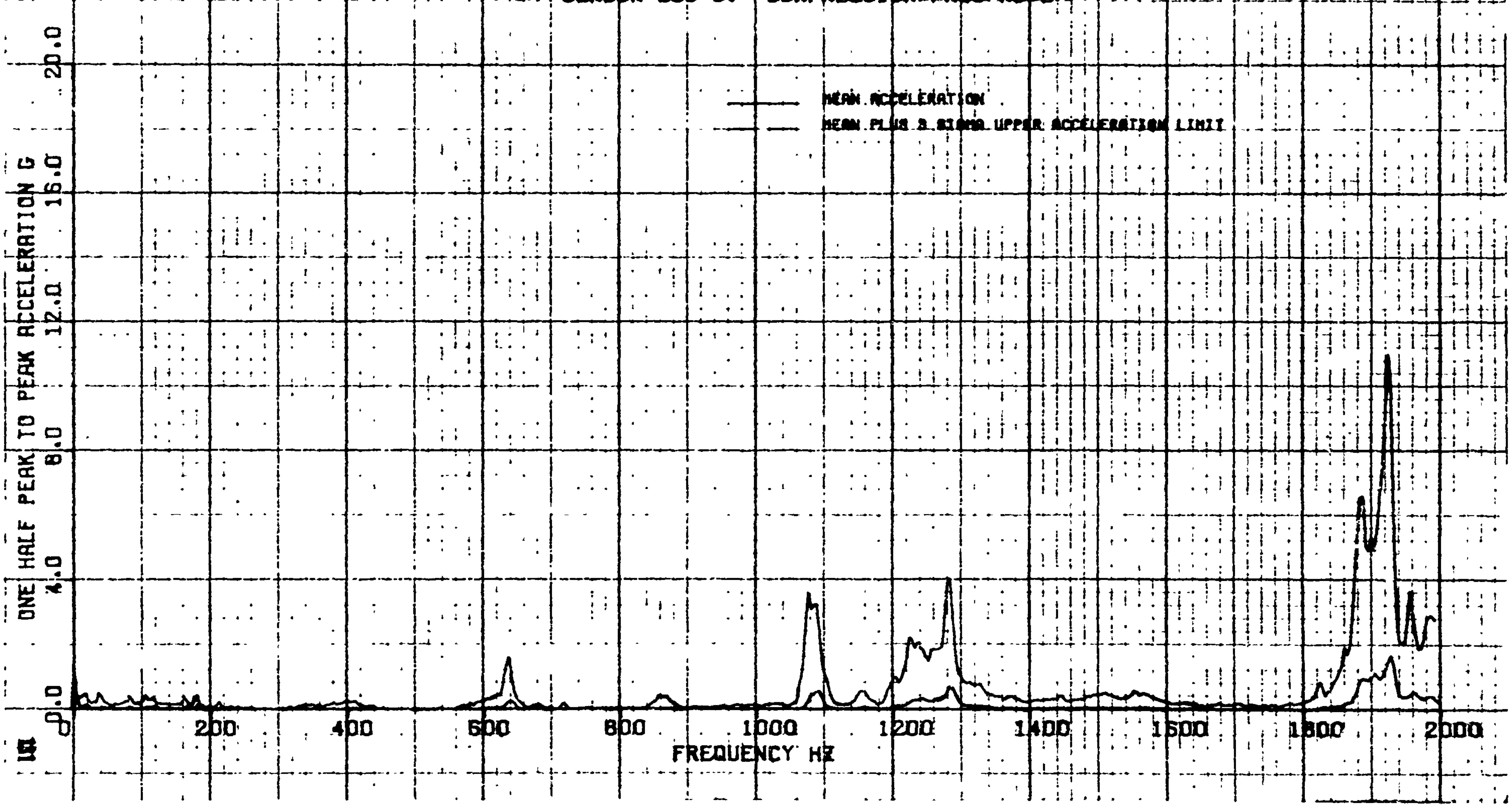


FIG 30

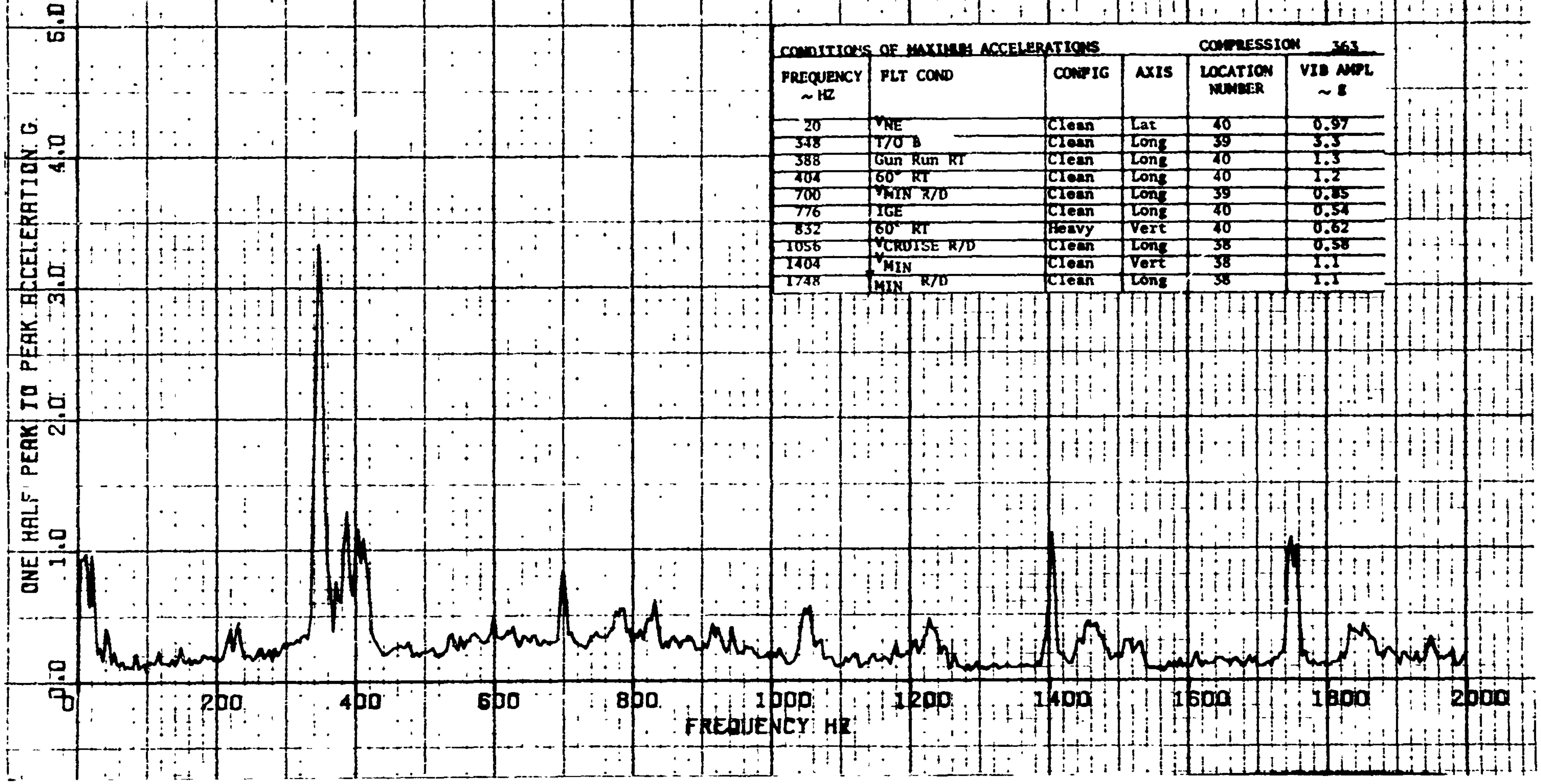
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1J AG USA S/N 57-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMBINED NONFIRING TEST CONDS ENG MOUNTS-COMB AXIS VIB PLOT 363

SENSOR LOC 38.39.40 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 363

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
20	V_{NE}	Clean	Lat	40	0.97
348	T/O B	Clean	Long	39	3.3
388	Gun Run RT	Clean	Long	40	1.3
404	60° RT	Clean	Long	40	1.2
700	V_{MIN} R/D	Clean	Long	39	0.85
776	IGE	Clean	Long	40	0.54
832	60° RT	Heavy	Vert	40	0.62
1056	V_{CRUISE} R/D	Clean	Long	38	0.58
1404	V_{MIN}	Clean	Vert	38	1.1
1748	V_{MIN} R/D	Clean	Long	38	1.1

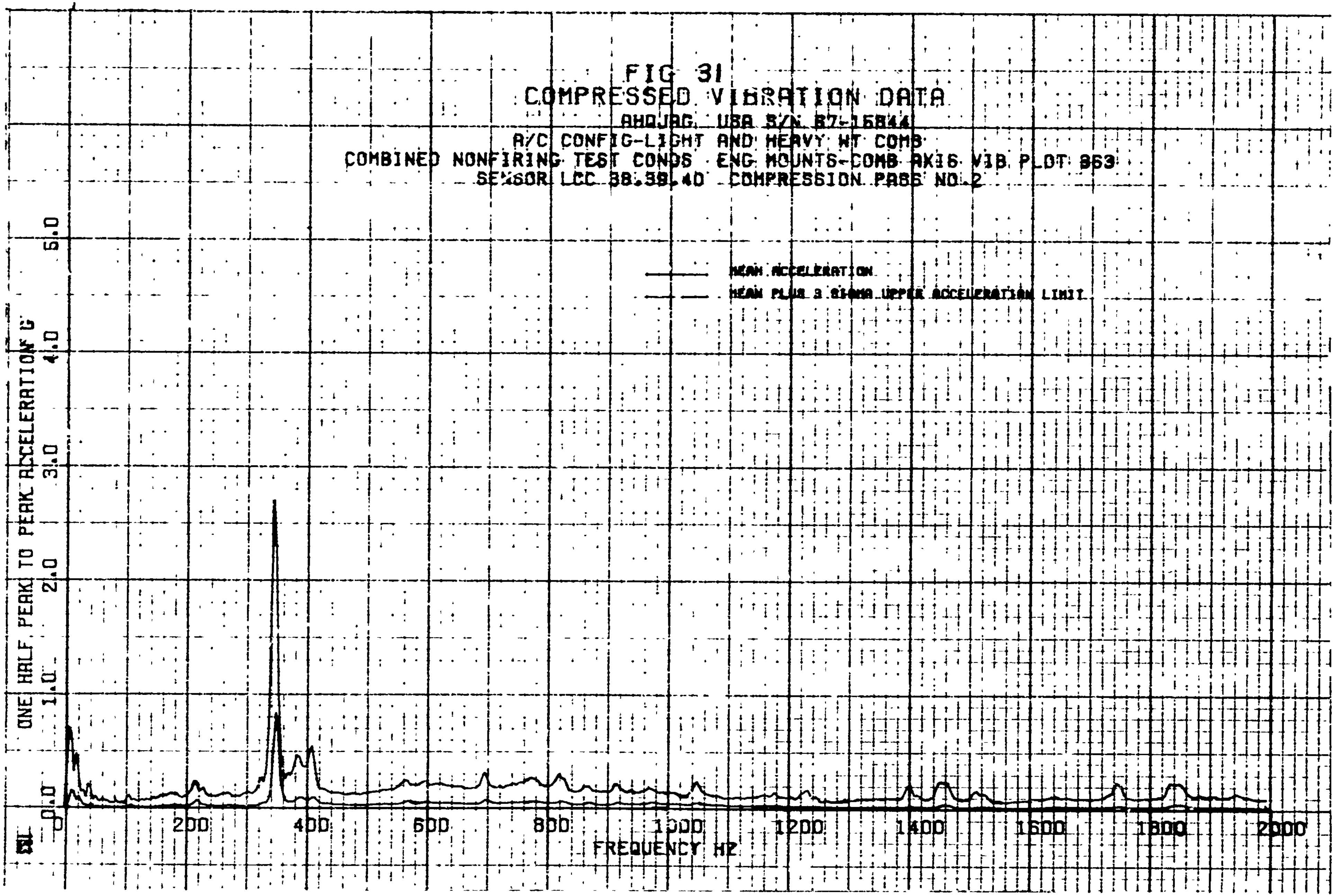
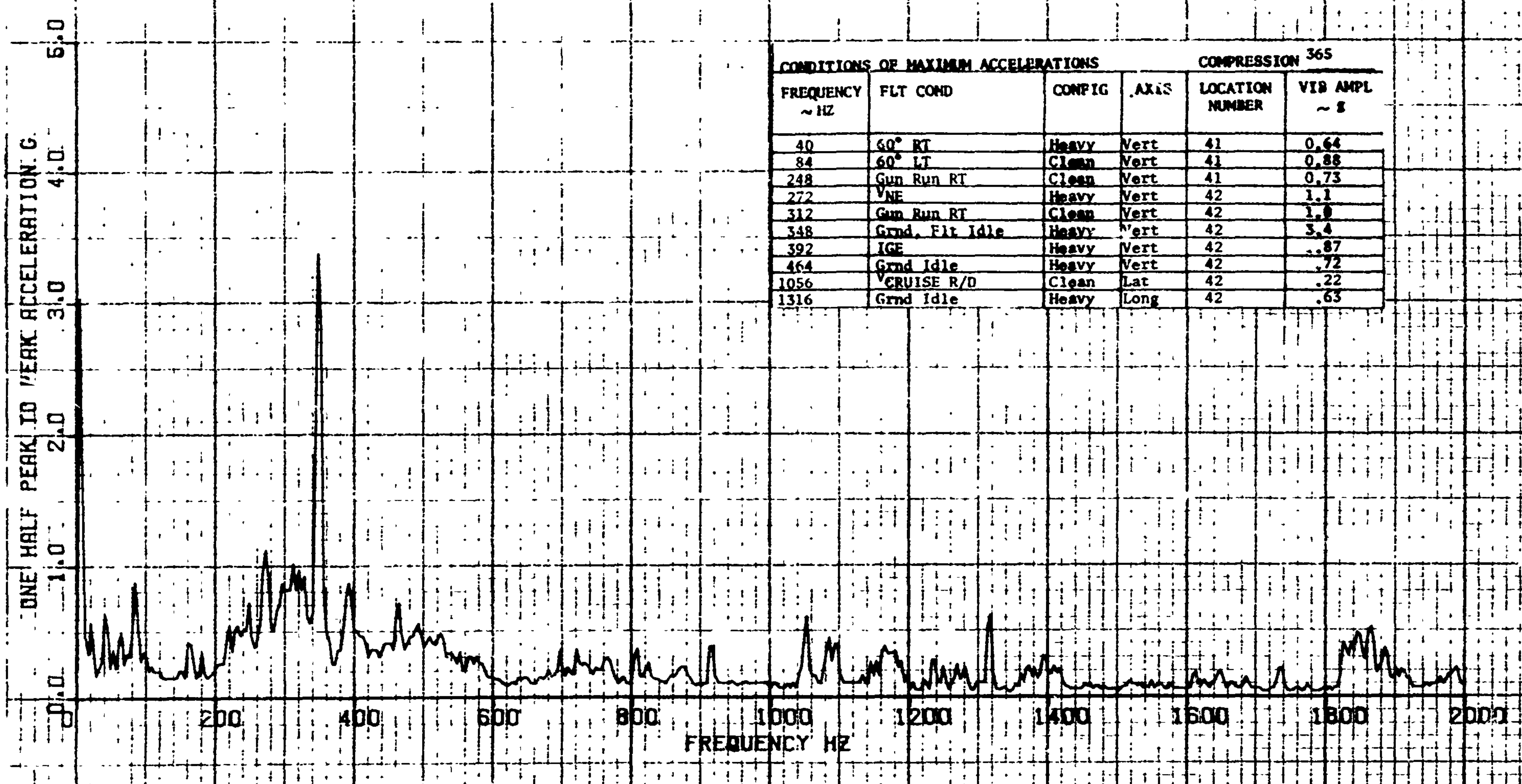


FIG 31
COMPRESSED VIBRATION DATA
AHQJAG USA S/N 87-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS ENG MOUNTS-COMB AXIS VIB PLOT 863
SENSOR LCC 38,39,40 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 32
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844
R/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS ENG DECK-COMB AXIS VIB PLOT 365
SENSOR LOC 41,42 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS				COMPRESSION 365	
FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
40	60° RT	Heavy	Vert	41	0.64
84	60° LT	Clean	Vert	41	0.88
248	Gun Run RT	Clean	Vert	41	0.73
272	V_{NE}	Heavy	Vert	42	1.1
312	Gun Run RT	Clean	Vert	42	1.[illegible]
348	Grnd. Flt Idle	Heavy	Vert	42	3.4
392	IGE	Heavy	Vert	42	.87
464	Grnd Idle	Heavy	Vert	42	.72
1056	V_{CRUISE} R/D	Clean	Lat	42	.22
1316	Grnd Idle	Heavy	Long	42	.63

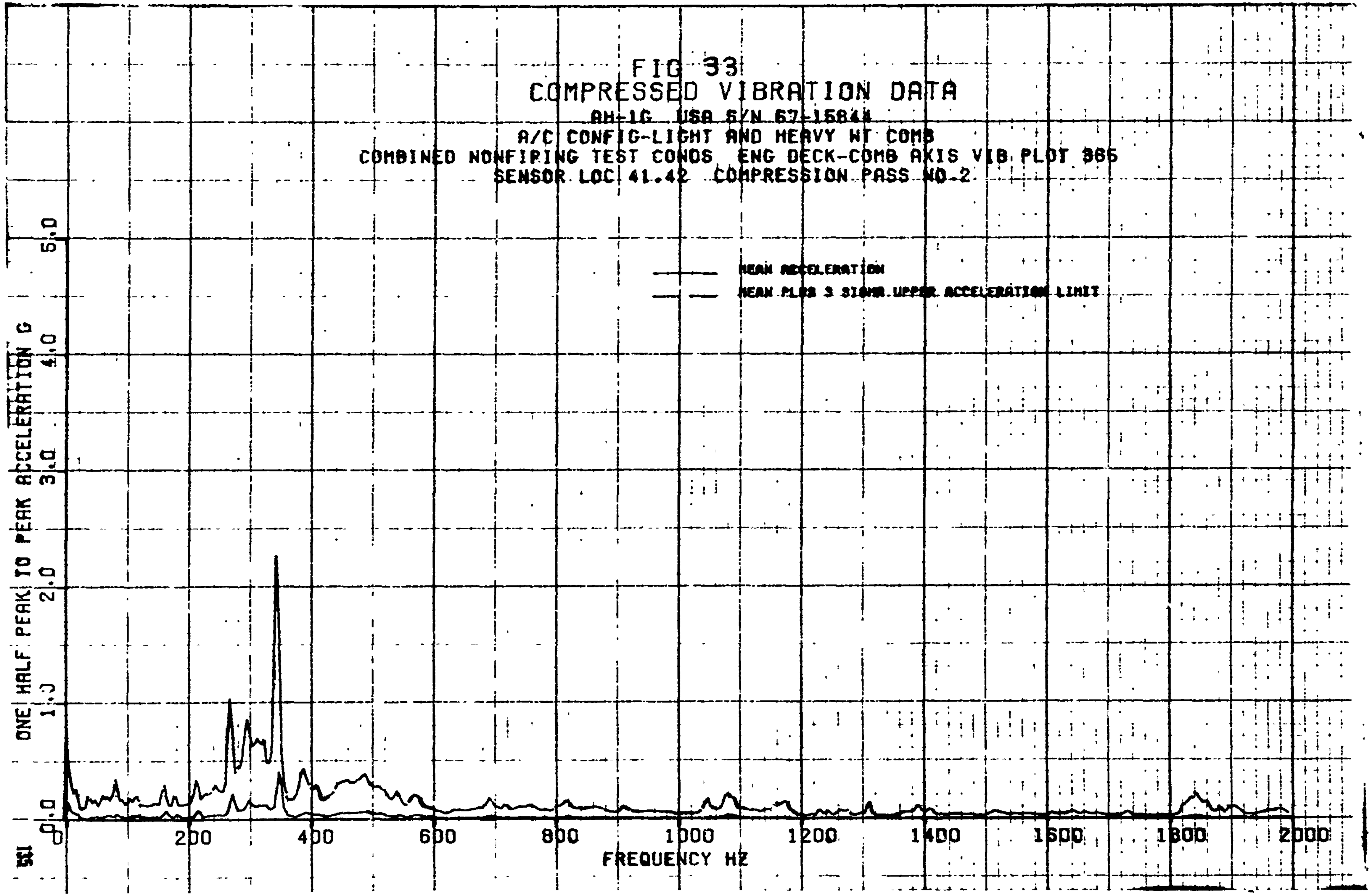
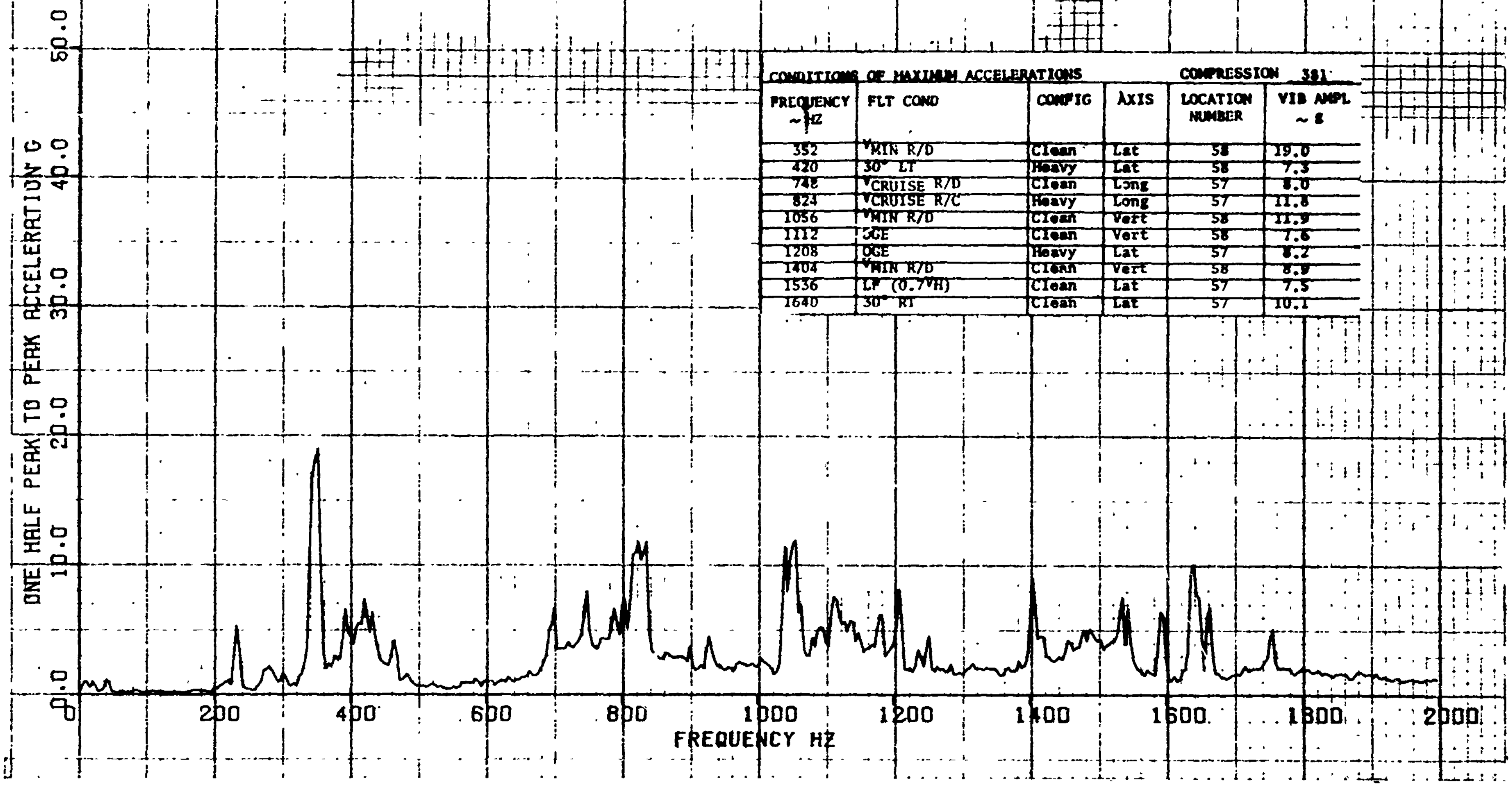


FIG 33
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS ENG DECK-COMB AXIS VIB PLOT 365
SENSOR LOC 41.42 COMPRESSION PASS NO-2

FIG 34
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS ENGINE-COMB AXIS VIB PLOT 381
SENSOR LOC 56.57.58 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 381

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
352	^{V}MIN R/D	Clean	Lat	58	19.0
420	30° LT	Heavy	Lat	58	7.3
748	^{V}CRUISE R/D	Clean	Long	57	8.0
824	^{V}CRUISE R/C	Heavy	Long	57	11.8
1056	^{V}MIN R/D	Clean	Vert	58	11.9
1112	IGE	Clean	Vert	58	7.6
1208	OGE	Heavy	Lat	57	8.2
1404	^{V}MIN R/D	Clean	Vert	58	8.9
1536	LF (0.7^{V}H)	Clean	Lat	57	7.5
1640	30° RT	Clean	Lat	57	10.1

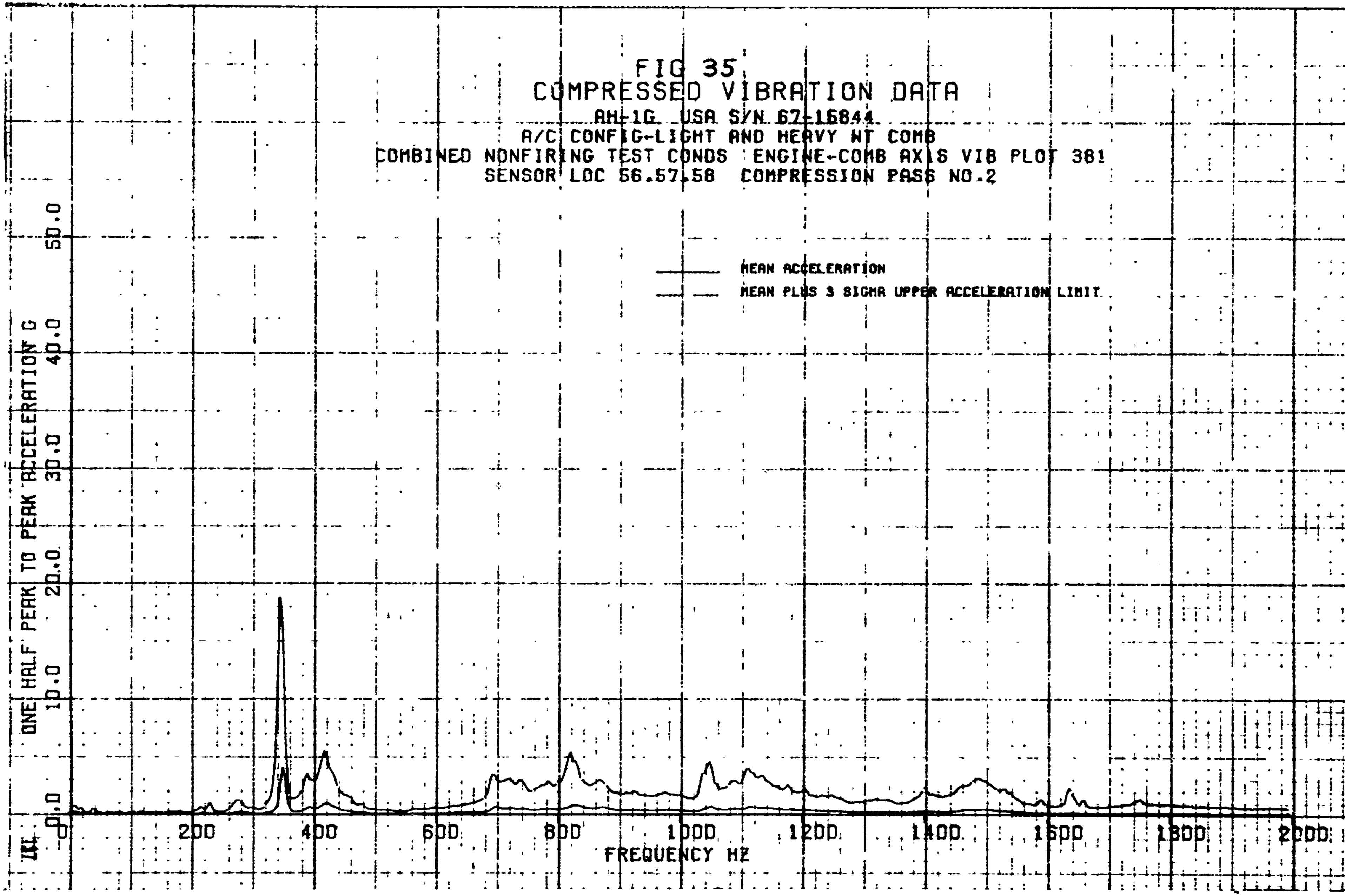


FIG 35
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS ENGINE-COMB AXIS VIB PLOT 381
SENSOR LOC 56.57.58 COMPRESSION PASS NO.2

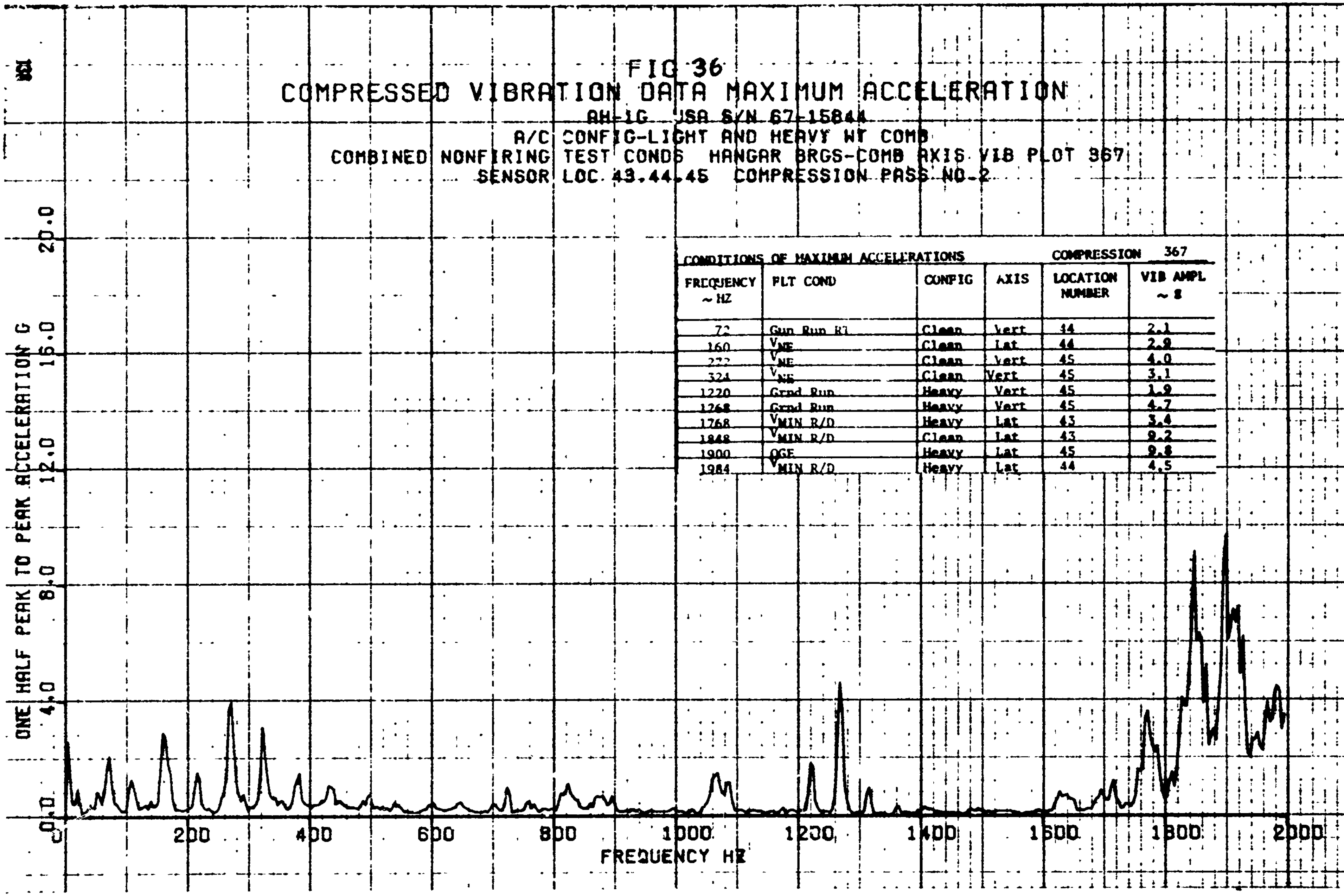


FIG 36
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS HANGAR BRGS-COMB AXIS VIB PLOT 367
SENSOR LOC 43.44.45 COMPRESSION PASS NO-2

CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 367

FREQUENCY ~ HZ	PLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
72	Gun Run R1	Clean	Vert	44	2.1
160	V_{NE}	Clean	Lat	44	2.9
272	V_{NE}	Clean	Vert	45	4.0
324	V_{NE}	Clean	Vert	45	3.1
1220	Grnd Run	Heavy	Vert	45	1.9
1268	Grnd Run	Heavy	Vert	45	4.7
1768	V_{MIN} R/D	Heavy	Lat	43	3.4
1848	V_{MIN} R/D	Clean	Lat	43	9.2
1900	OGE	Heavy	Lat	45	9.8
1984	V_{MIN} R/D	Heavy	Lat	44	4.5

FIG 37
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS HANGAR BRGS-COMB AXIS VIB PLOT 367
SENSOR LOC 43.44.45 COMPRESSION PASS NO 2

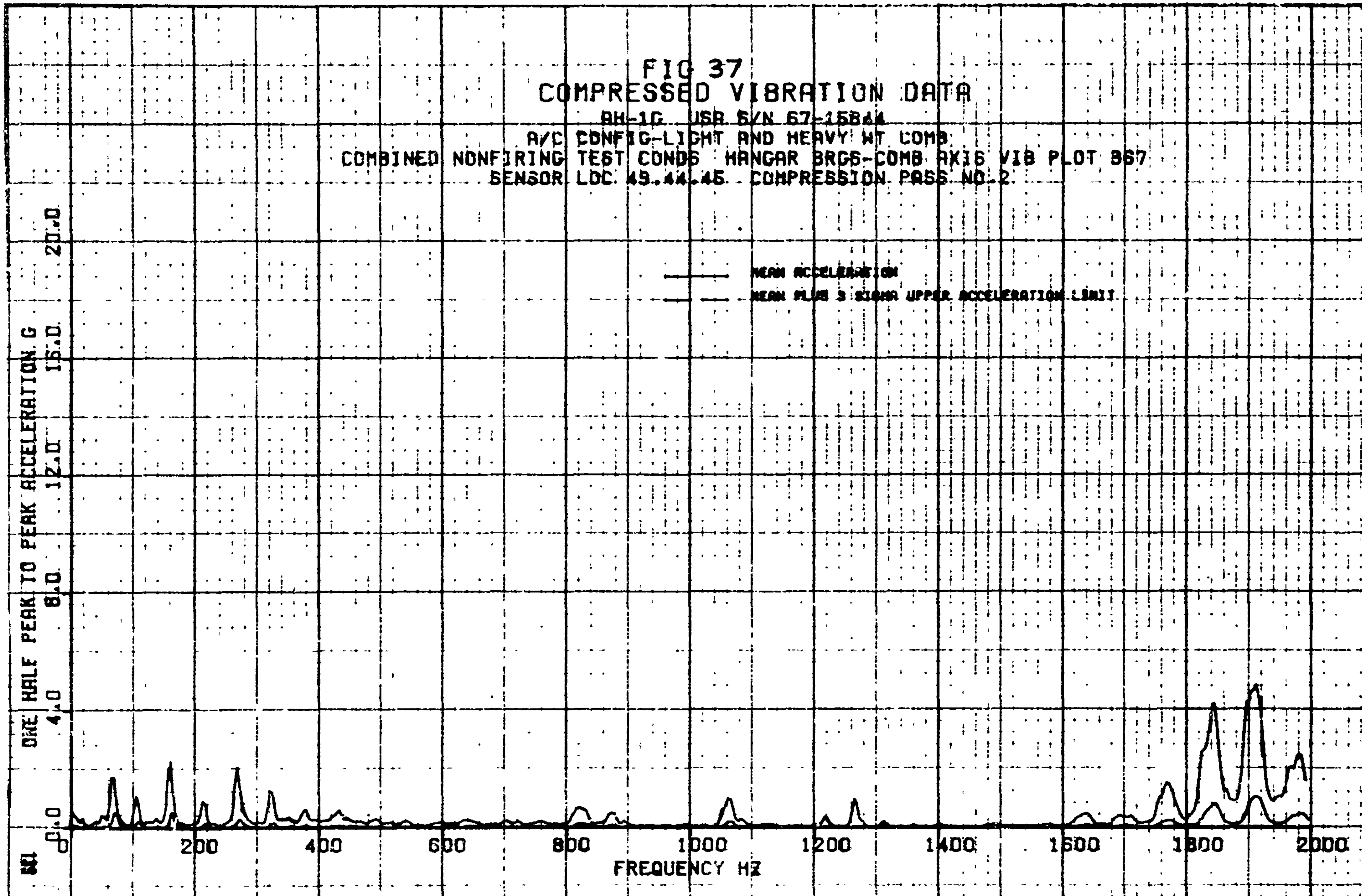


FIG 38

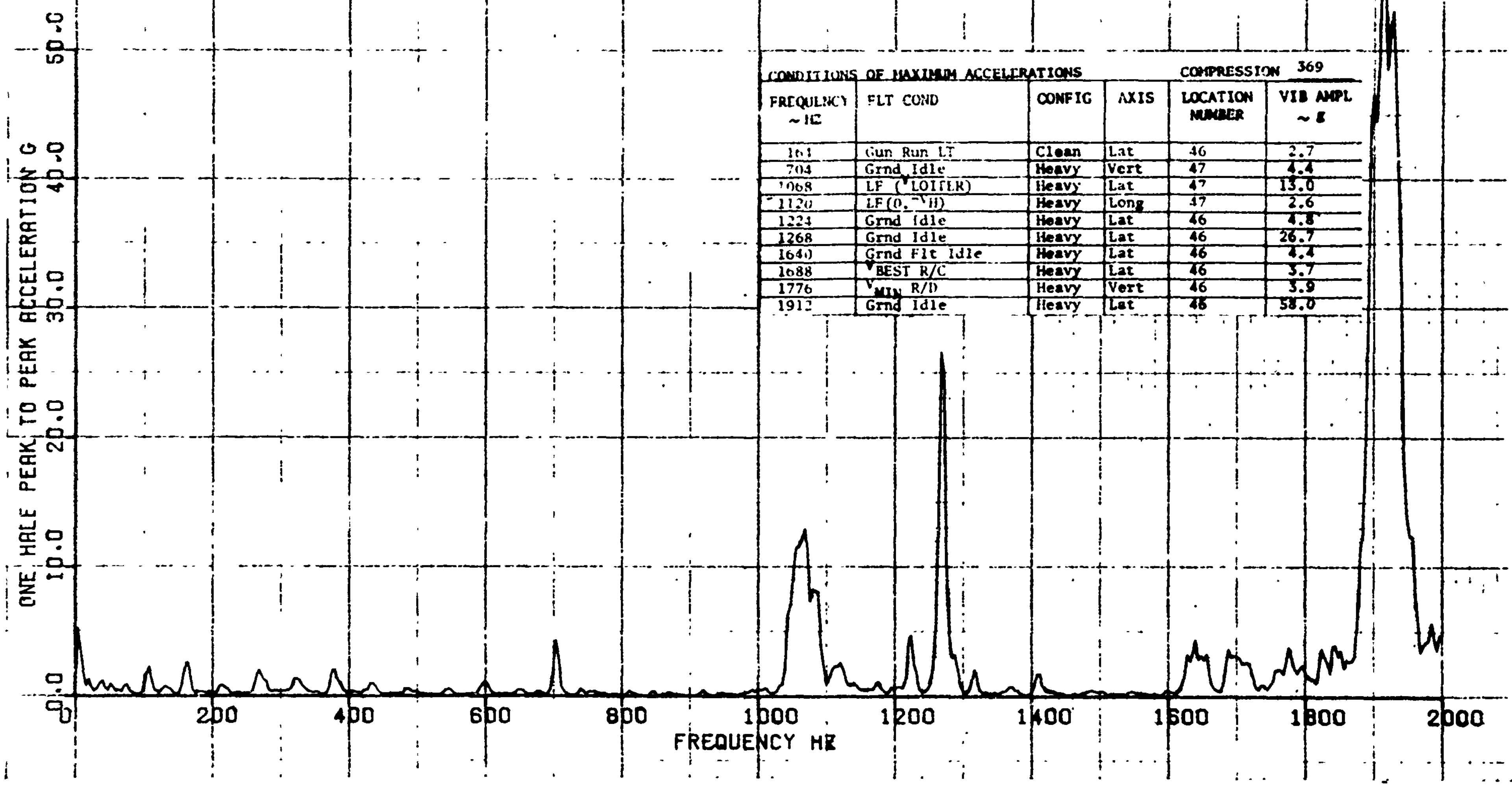
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMBINED NONFIRING TEST CONDS 42 AND 90 DEG GB-COMB AXIS VIB PLOT 369

SENSOR LOC 46.47 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 369

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
161	Gun Run LT	Clean	Lat	46	2.7
704	Grnd Idle	Heavy	Vert	47	4.4
1068	LF (V_{LOITER})	Heavy	Lat	47	13.0
1120	LF (0.[illegible] V_H)	Heavy	Long	47	2.6
1224	Grnd Idle	Heavy	Lat	46	4.8
1268	Grnd Idle	Heavy	Lat	46	26.7
1640	Grnd Flt Idle	Heavy	Lat	46	4.4
1688	V_{BEST} R/C	Heavy	Lat	46	3.7
1776	V_{MIN} R/D	Heavy	Vert	46	3.9
1912	Grnd Idle	Heavy	Lat	46	58.0

FIG 39
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS 42 AND 90 DEG GB-COMB AXIS VIB PLOT 369
SENSOR LOC 46.47 COMPRESSION PASS NO.2

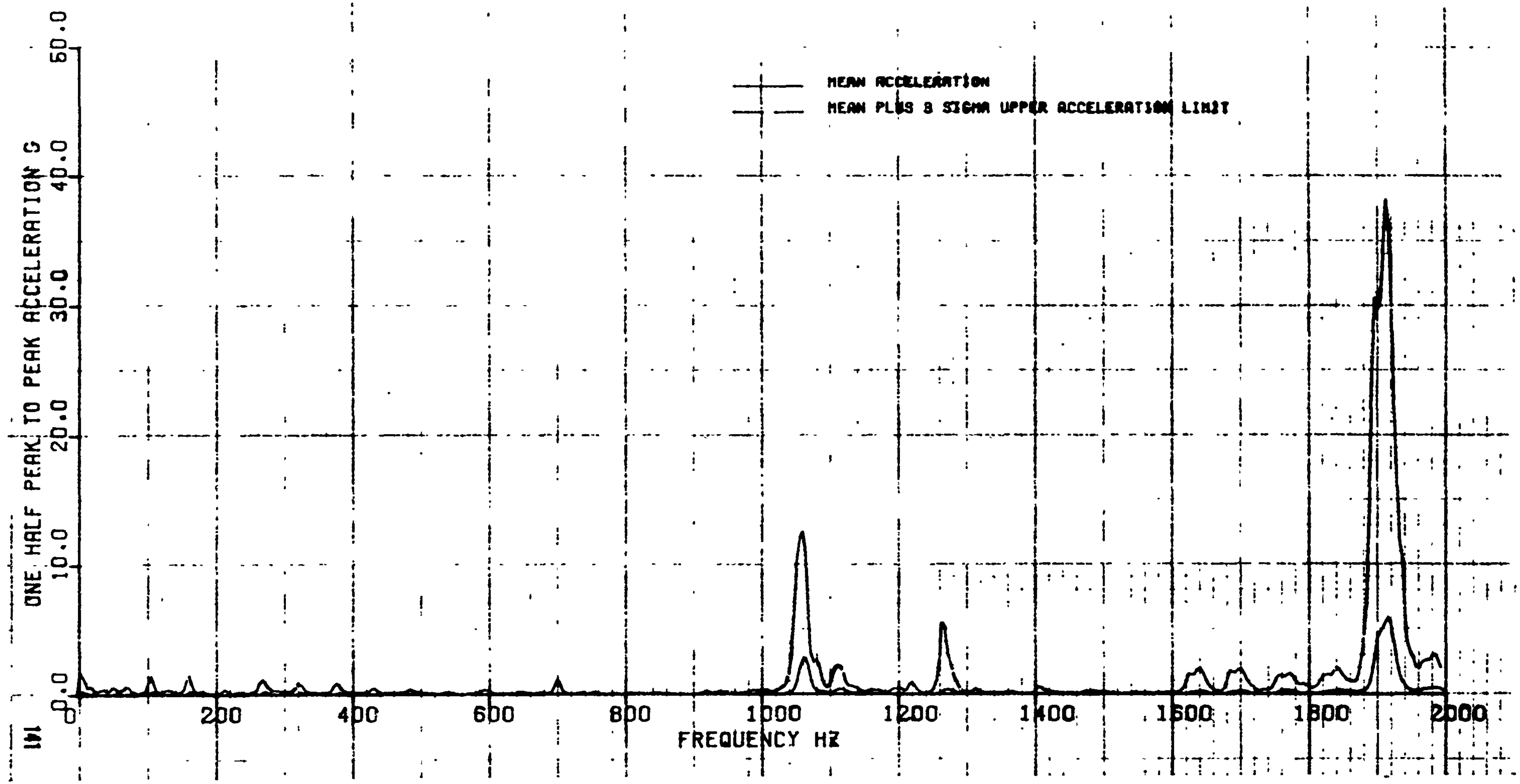


FIG 40

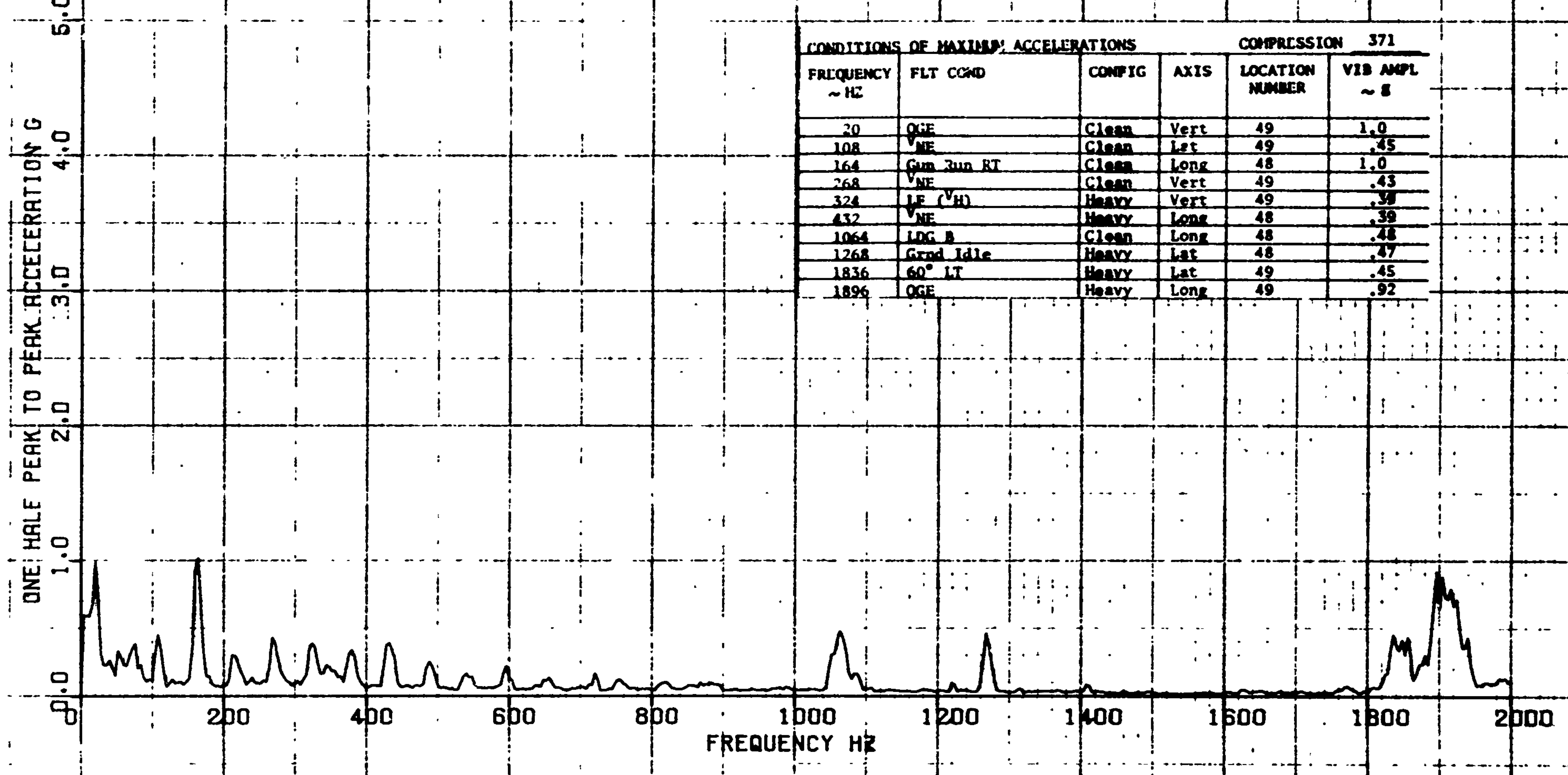
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB NONFIRING TEST CONDS TAIL BOOM ATTACH PTS-COMB AXIS VIB PLOT 371

SENSOR LOC 48.49 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 371

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
20	OGE	Clean	Vert	49	1.0
108	V_{NE}	Clean	Lat	49	.45
164	Gun Run RT	Clean	Long	48	1.0
268	V_{NE}	Clean	Vert	49	.43
324	LF (V_H)	Heavy	Vert	49	.38
432	V_{NE}	Heavy	Long	48	.39
1064	LDG B	Clean	Long	48	.48
1268	Grnd Idle	Heavy	Lat	48	.47
1836	60° LT	Heavy	Lat	49	.45
1896	OGE	Heavy	Long	49	.92

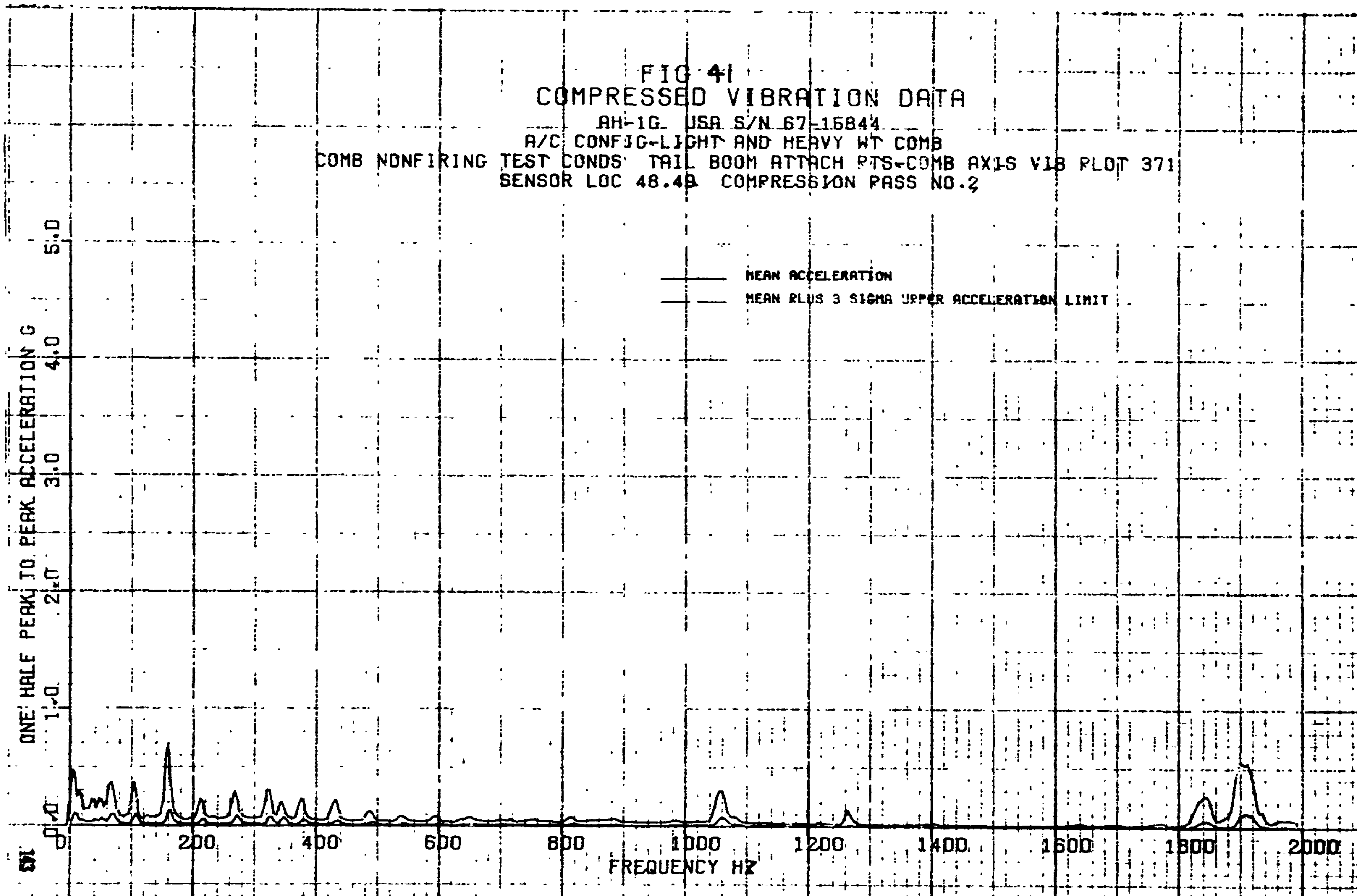
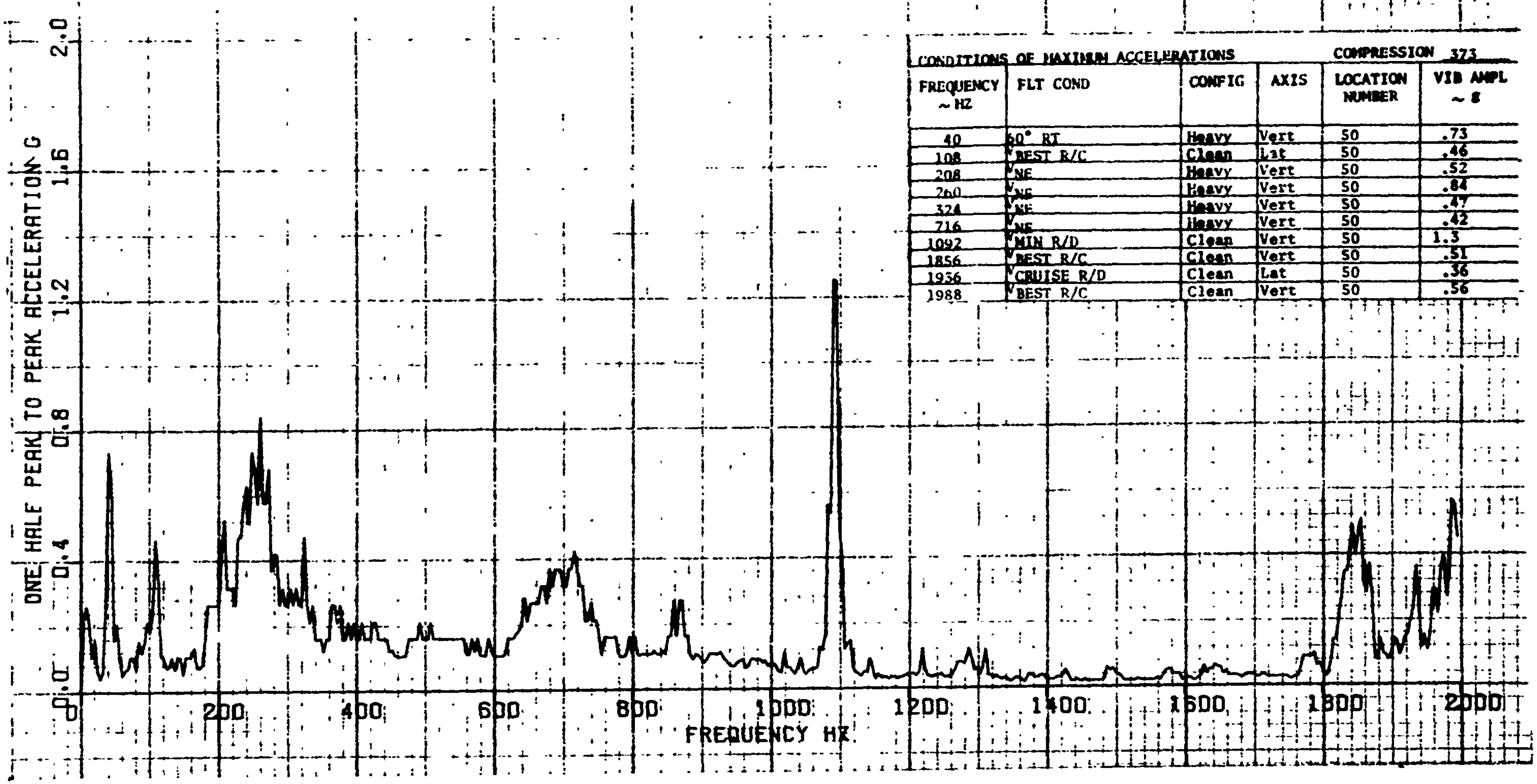


FIG 41
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB NONFIRING TEST CONDS TAIL BOOM ATTACH PTS-COMB AXIS V1B PLOT 371
SENSOR LOC 48.4B COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 42
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS CLTV SERVO-COMB AXIS VIB PLOT 373
SENSOR LOC 50 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS				COMPRESSION 373	
FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
40	60° RT	Heavy	Vert	50	.73
108	$V_{BEST\ R/C}$	Clean	Lat	50	.46
208	V_{NE}	Heavy	Vert	50	.52
260	V_{NE}	Heavy	Vert	50	.84
324	V_{NE}	Heavy	Vert	50	.47
716	V_{NE}	Heavy	Vert	50	.42
1092	$V_{MIN\ R/D}$	Clean	Vert	50	1.3
1856	$V_{BEST\ R/C}$	Clean	Vert	50	.51
1936	$V_{CRUISE\ R/D}$	Clean	Lat	50	.36
1988	$V_{BEST\ R/C}$	Clean	Vert	50	.56

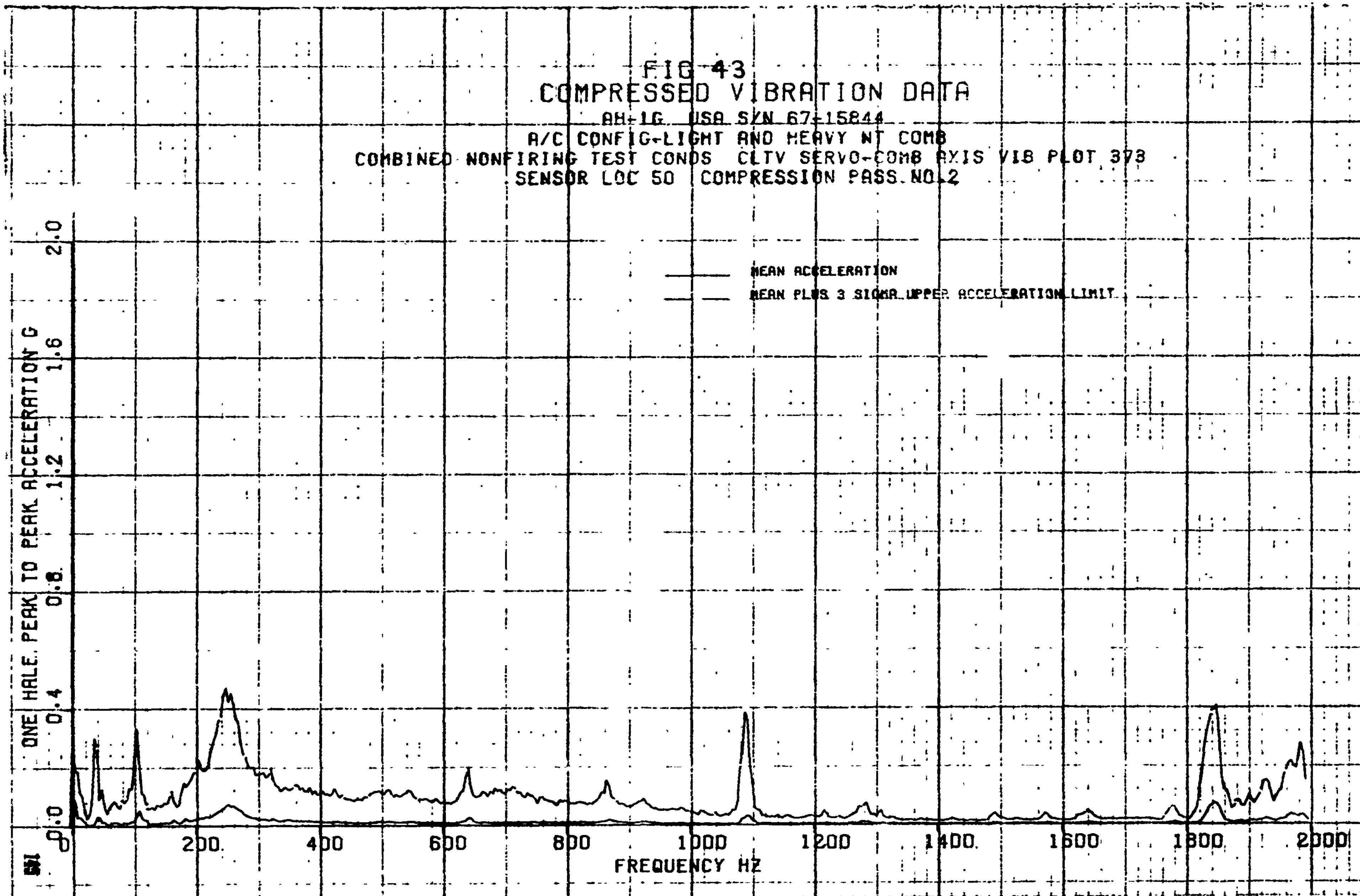


FIG 43
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS CLTV SERVO-COMB AXIS VIB PLOT 373
SENSOR LOC 50 COMPRESSION PASS NO.2

FIG 44

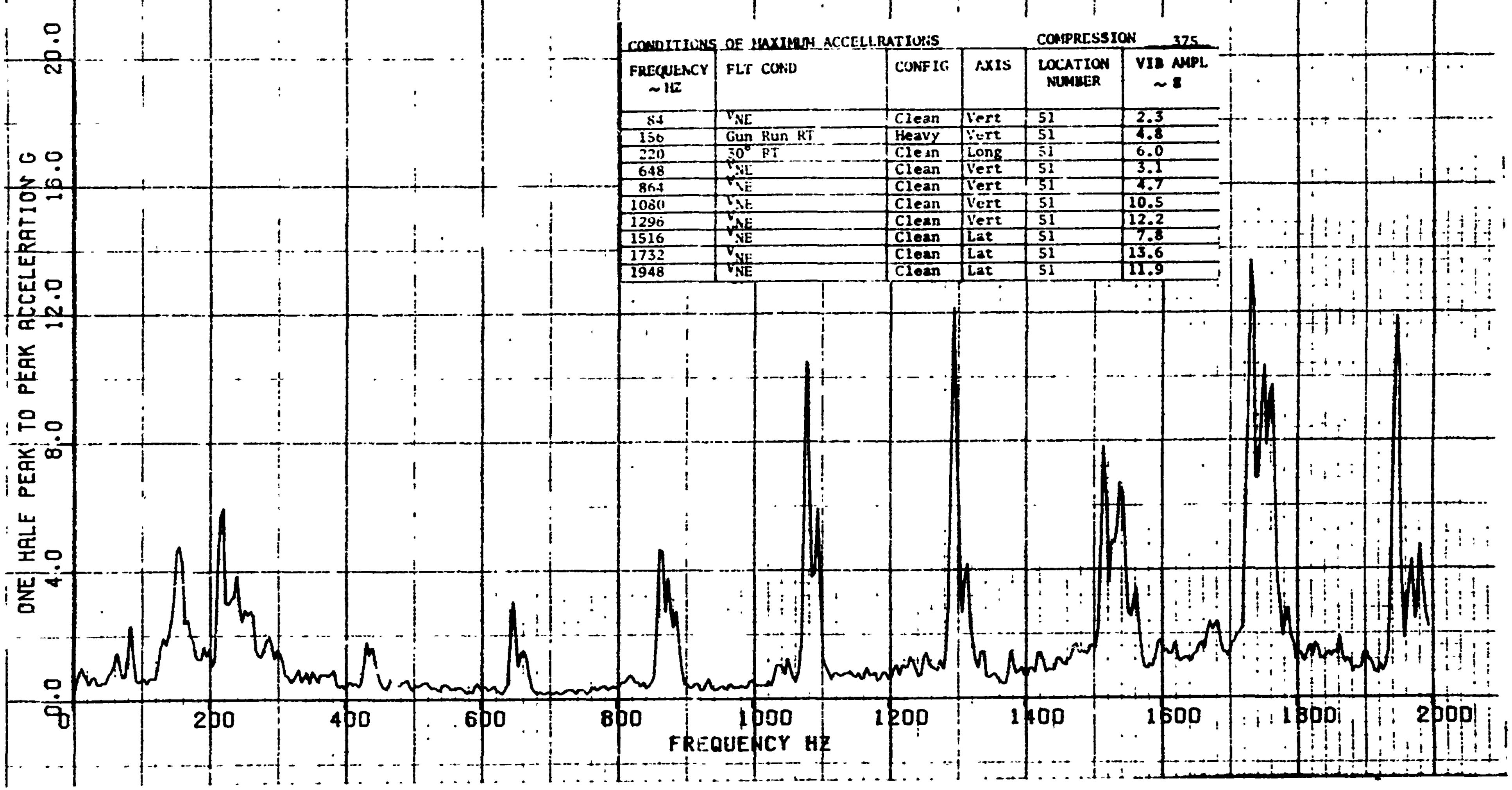
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMBINED NONFIRING TEST CONDS ELEV TIP-COMB AXIS VIB PLOT 375

SENSOR LOC 51 COMPRESSION PASS NO 2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 375

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
84	V_{NE}	Clean	Vert	51	2.3
156	Gun Run RT	Heavy	Vert	51	4.8
220	30° RT	Clean	Long	51	6.0
648	V_{NE}	Clean	Vert	51	3.1
864	V_{NE}	Clean	Vert	51	4.7
1080	V_{NE}	Clean	Vert	51	10.5
1296	V_{NE}	Clean	Vert	51	12.2
1516	V_{NE}	Clean	Lat	51	7.8
1732	V_{NE}	Clean	Lat	51	13.6
1948	V_{NE}	Clean	Lat	51	11.9

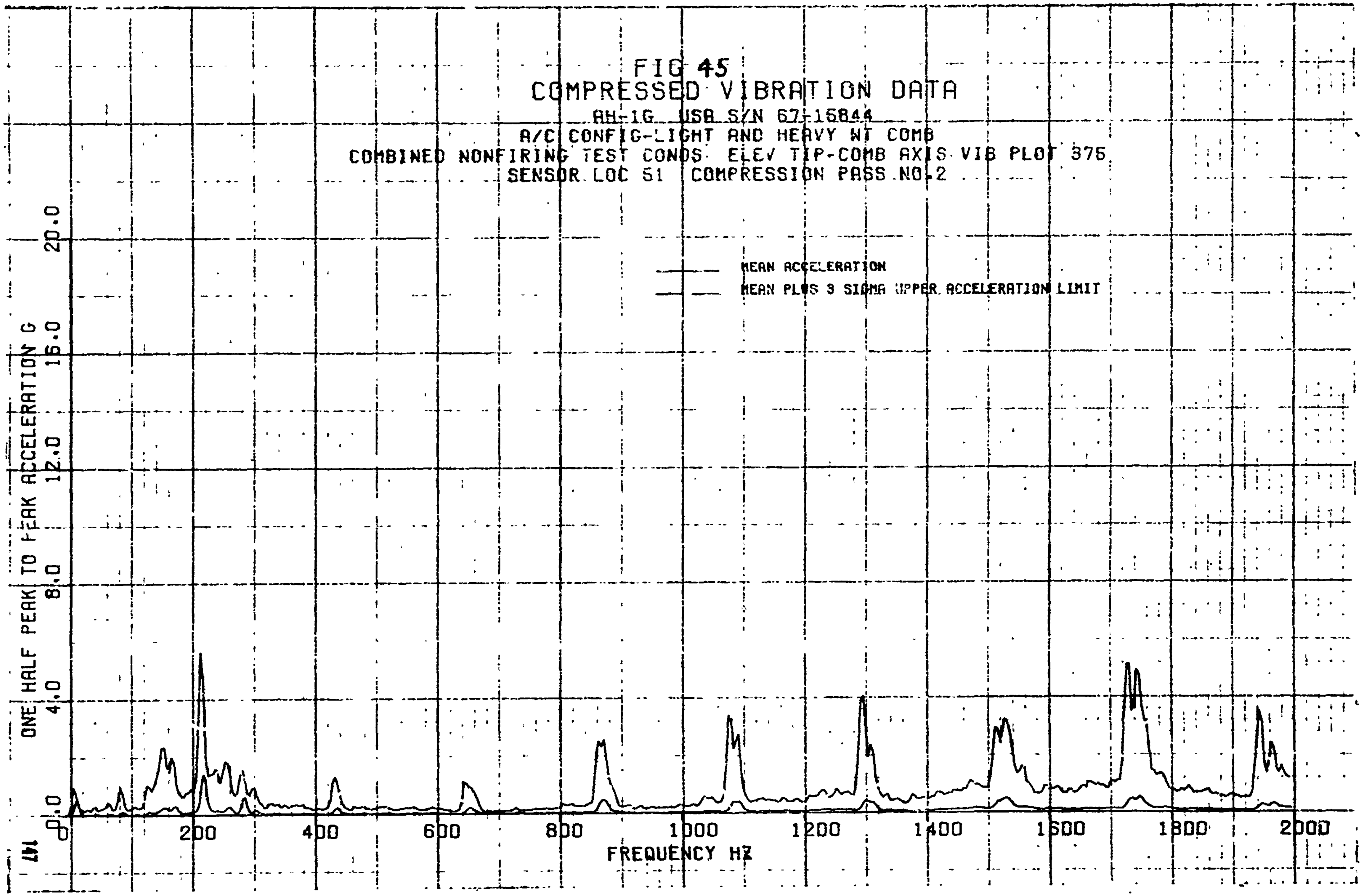
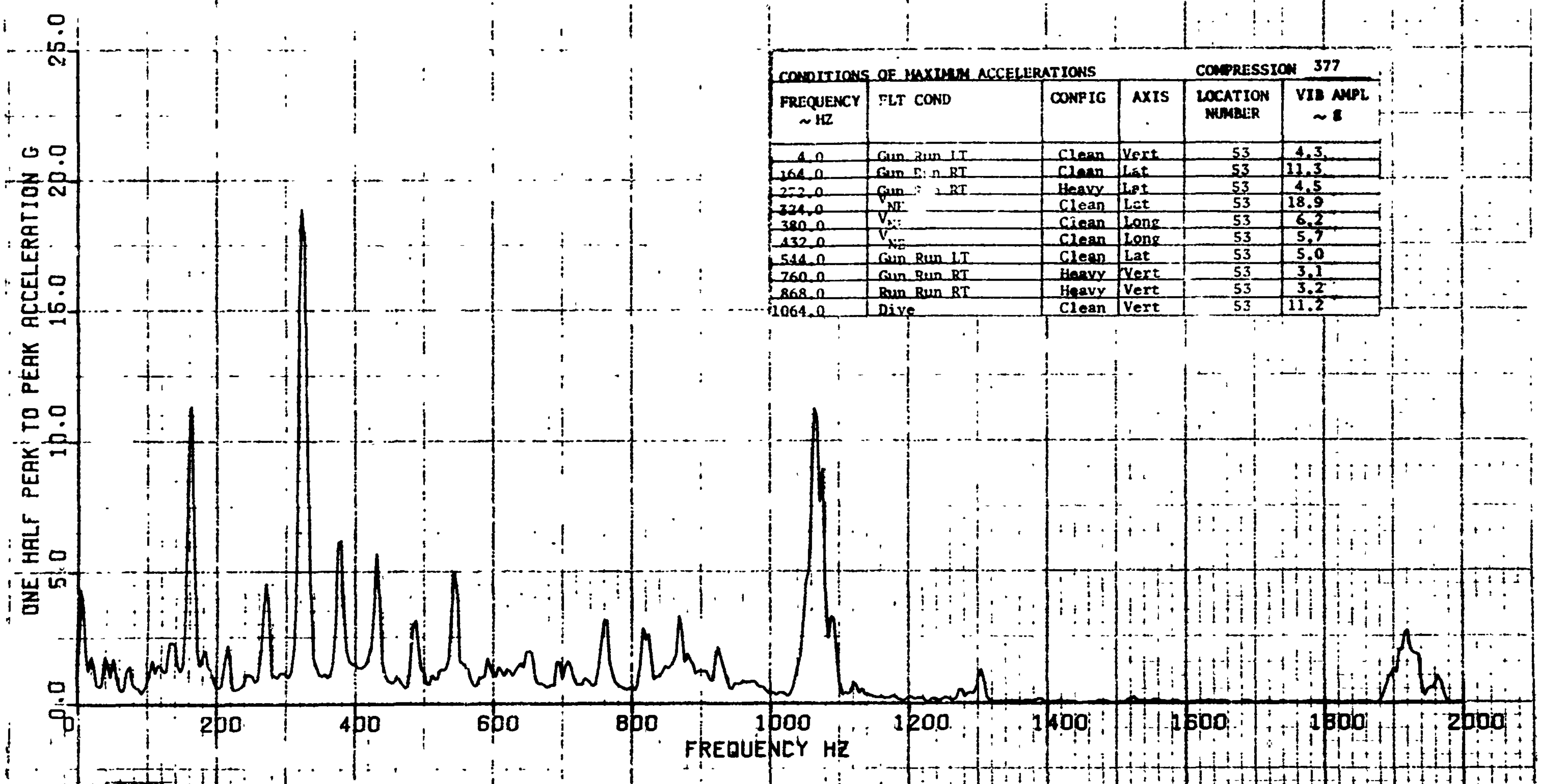


FIG 45
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS ELEV TIP-COMB AXIS VIB PLOT 375
SENSOR LOC 51 COMPRESSION PASS NO. 2

FIG 46
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS NAV LIGHTS-COMB AXIS VIB PLOT 377
SENSOR LOC 52.53 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 377

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
4.0	Gun Run LT	Clean	Vert	53	4.3
164.0	Gun Run RT	Clean	Lat	53	11.3
272.0	Gun Run RT	Heavy	Lat	53	4.5
324.0	V_{NE}	Clean	Lat	53	18.9
380.0	V_{NE}	Clean	Long	53	6.2
432.0	V_{NE}	Clean	Long	53	5.7
544.0	Gun Run LT	Clean	Lat	53	5.0
760.0	Gun Run RT	Heavy	Vert	53	3.1
868.0	Run Run RT	Heavy	Vert	53	3.2
1064.0	Dive	Clean	Vert	53	11.2

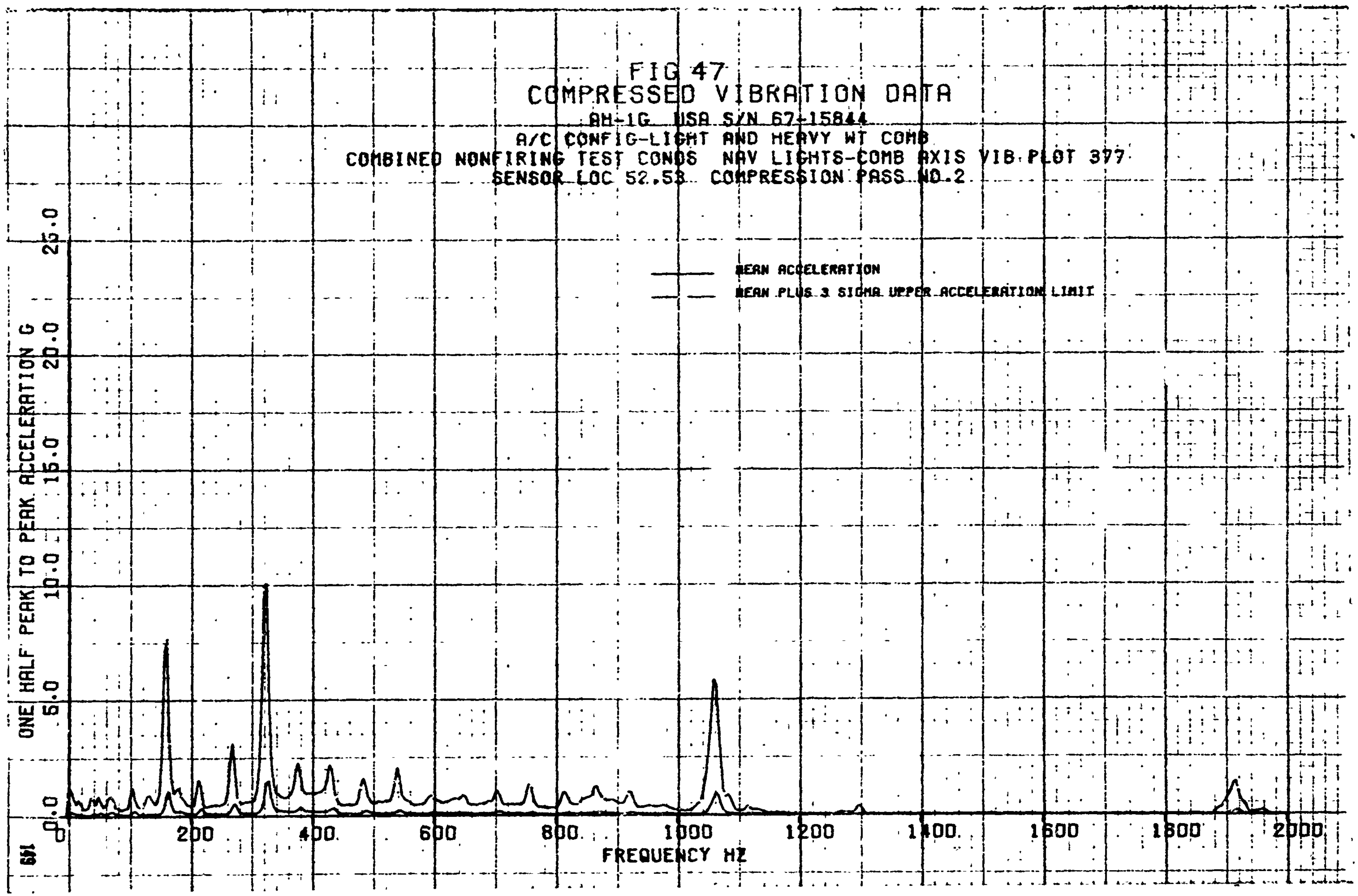
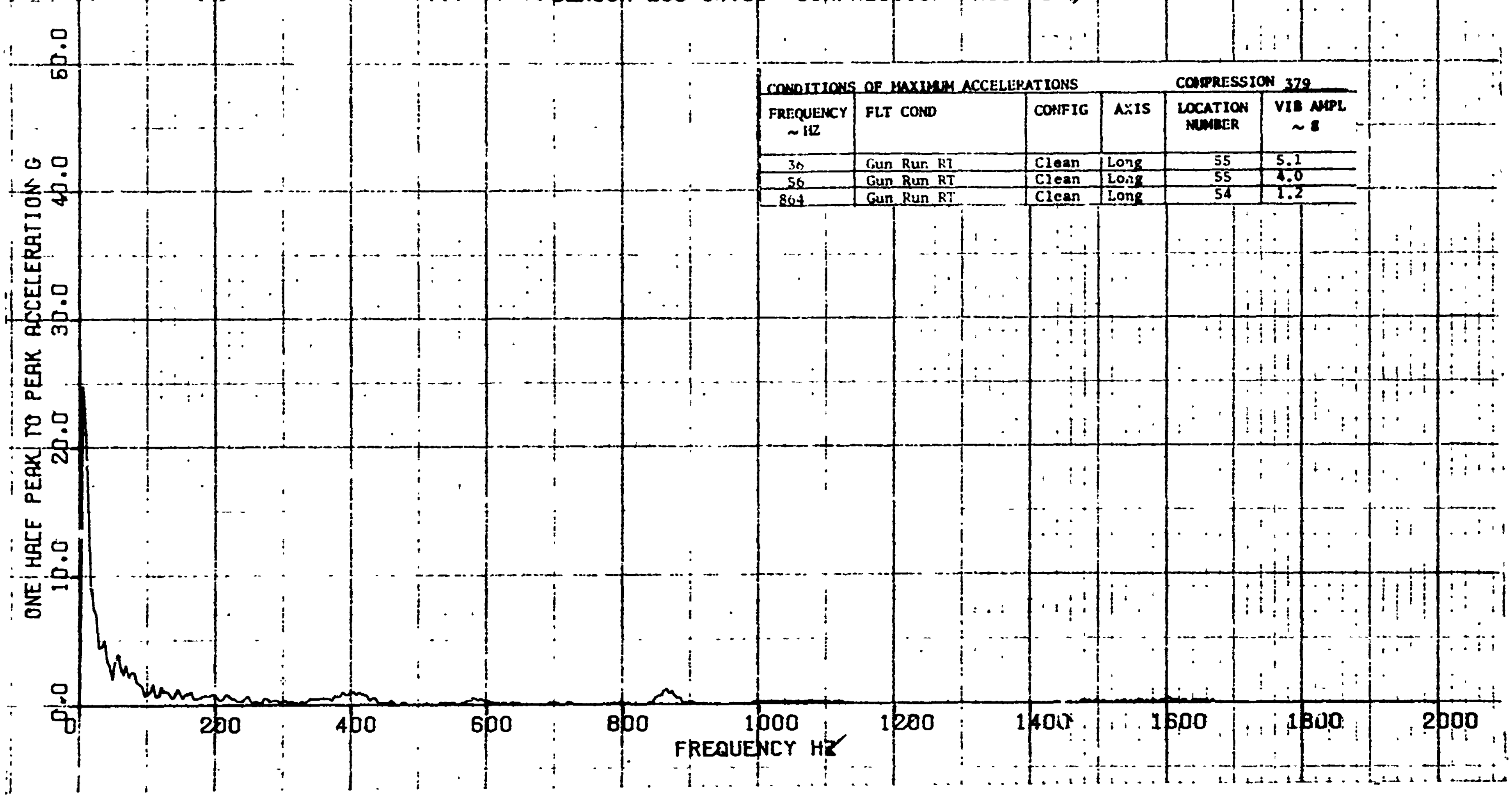


FIG 47
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS NAV LIGHTS-COMB AXIS VIB PLOT 377
SENSOR LOC 52.53 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
5.0
10.0
15.0
20.0
25.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 48
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USB S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS GUN MOUNTS-COMB AXIS VIB PLOT 379
SENSOR LOC 54.55 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 379

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
36	Gun Run RT	Clean	Long	55	5.1
56	Gun Run RT	Clean	Long	55	4.0
864	Gun Run RT	Clean	Long	54	1.2

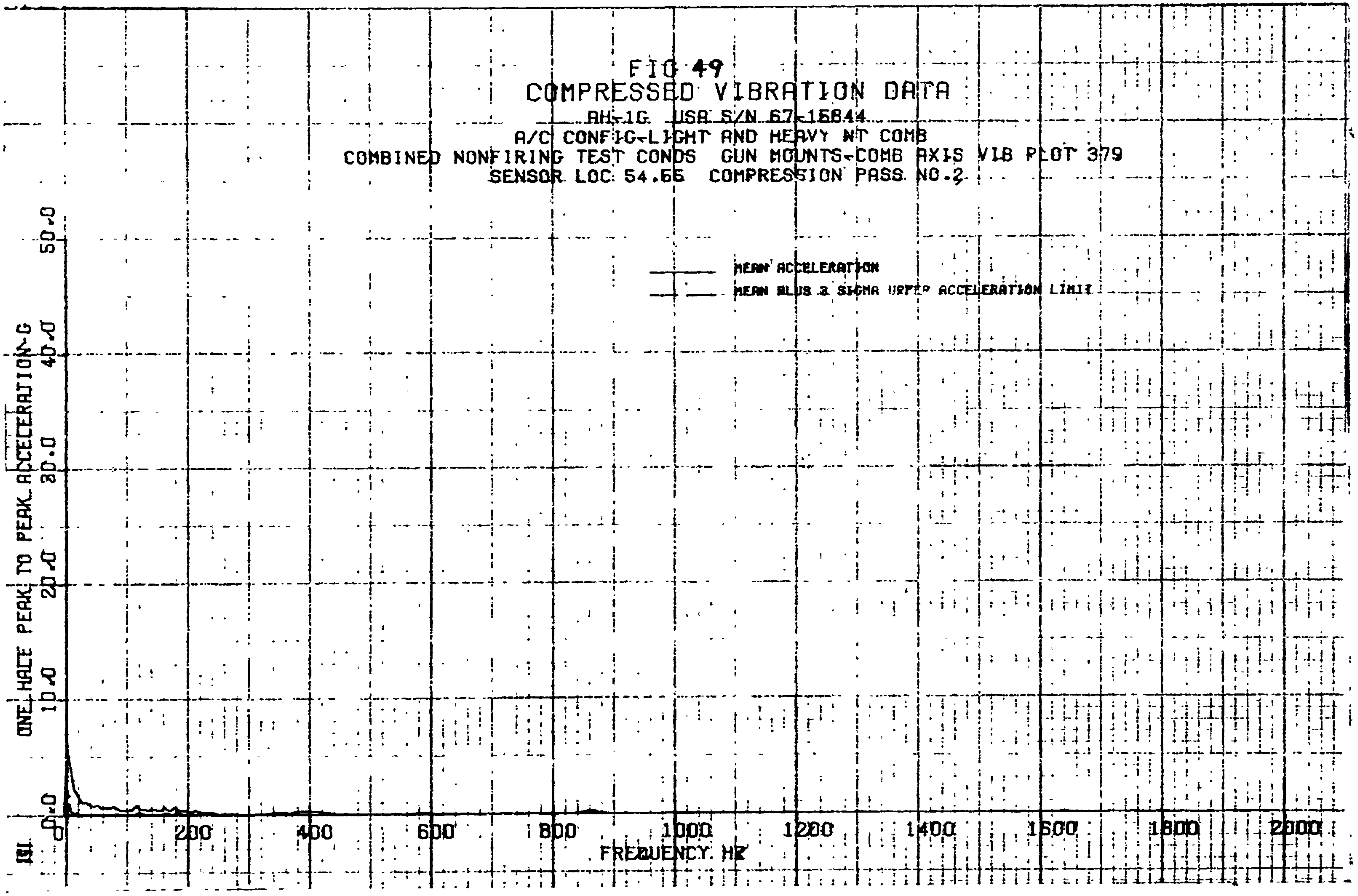


FIG 49
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMBINED NONFIRING TEST CONDS GUN MOUNTS-COMB AXIS VIB PLOT 379
SENSOR LOC 54.65 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION-G
50.0
40.0
30.0
20.0
10.0
0.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 50

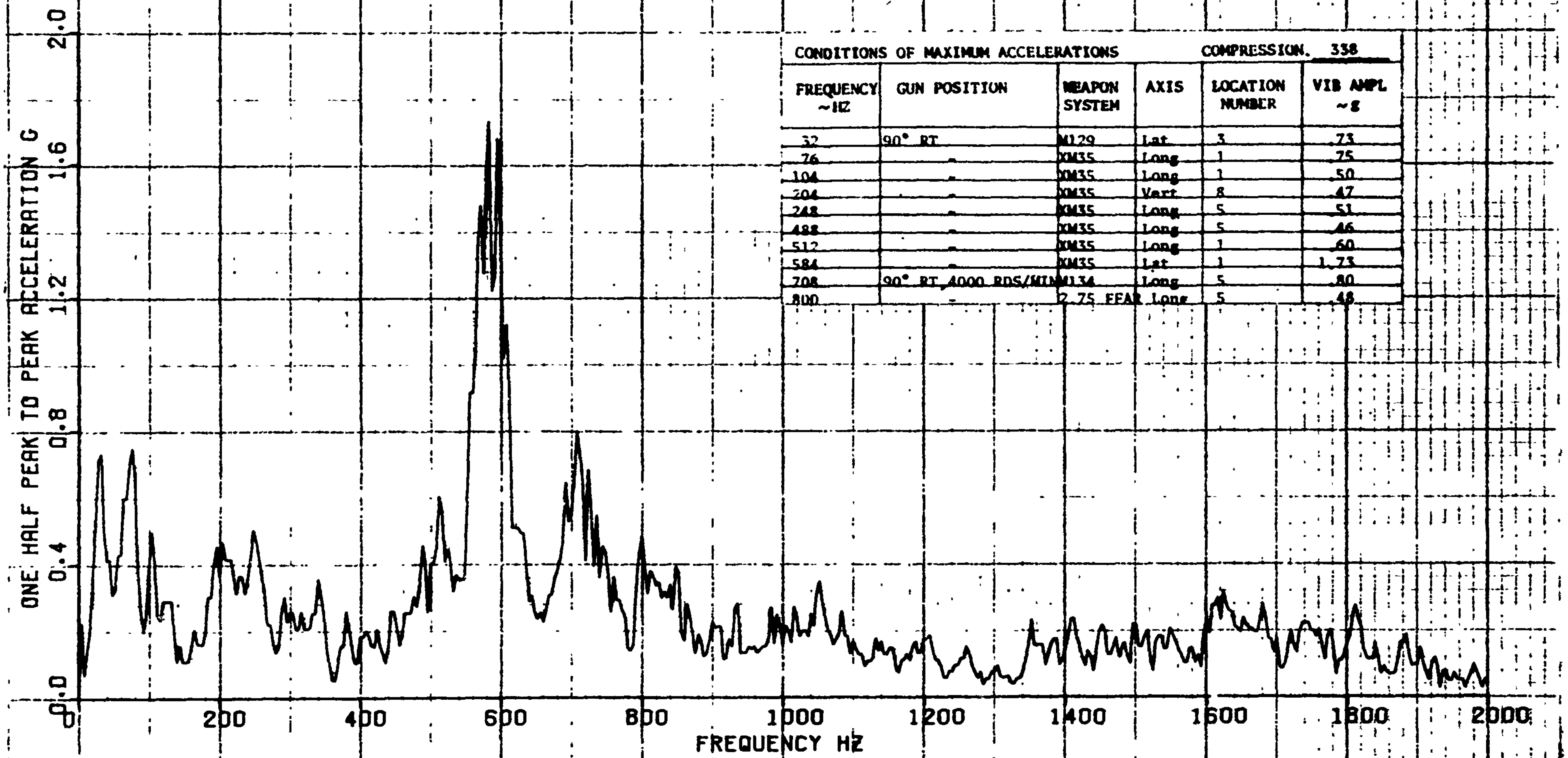
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB WEAPONS-COMB FIRING TEST CONDS PILOT INSTR PNL-COMB AXIS VIB PLOT 388

SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION. 338

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
32	90° RT	M129	Lat	3	.73
76	–	XM35	Long	1	.75
104	–	XM35	Long	1	.50
204	–	XM35	Vert	8	.47
248	–	XM35	Long	5	.51
488	–	XM35	Long	5	.46
512	–	XM35	Long	1	.60
584	–	XM35	Lat	1	1.73
708	90° RT 4000 RDS/MIN	M134	Long	5	.80
800	–	2.75 FFAR	Long	5	.48

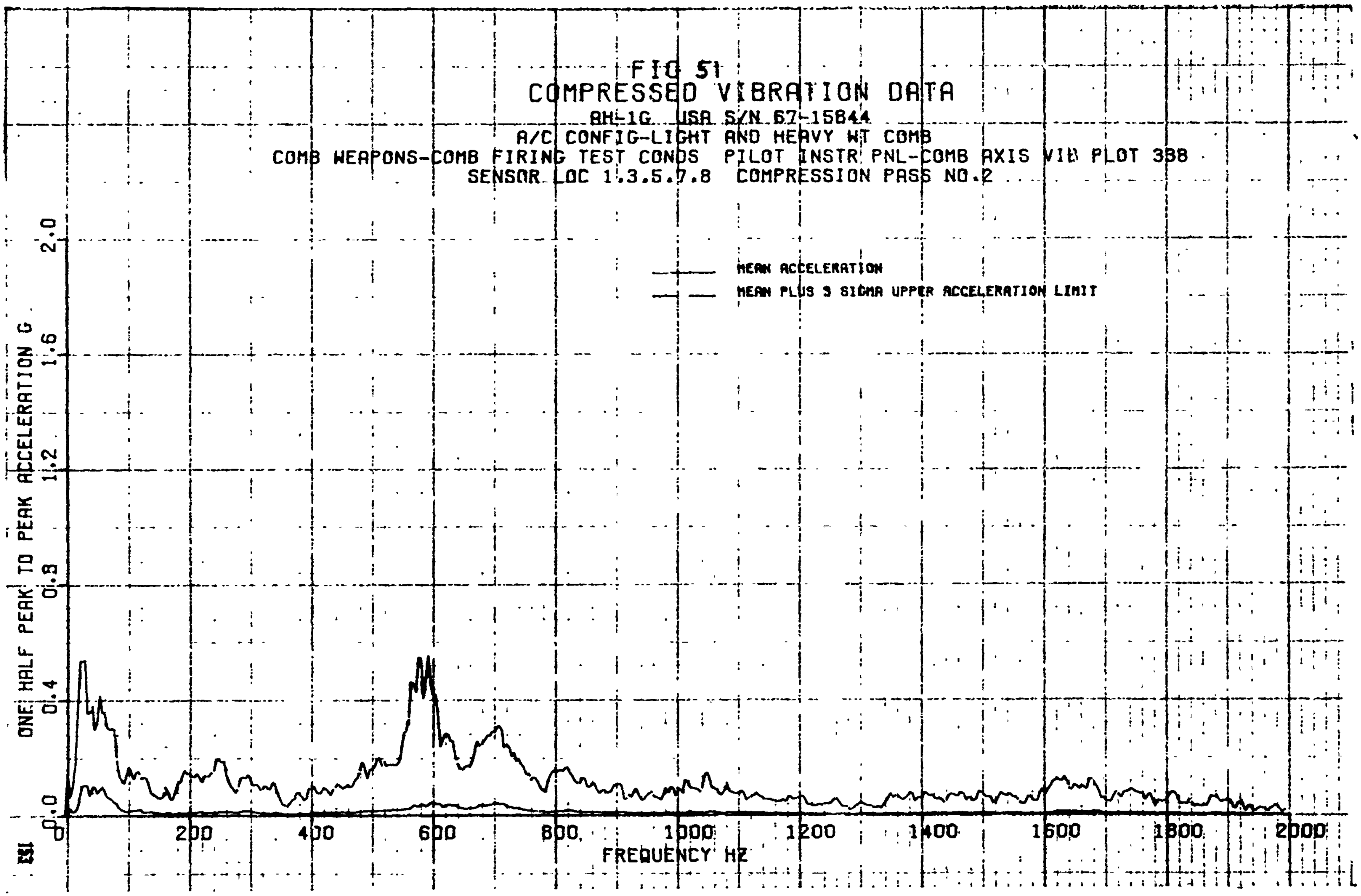
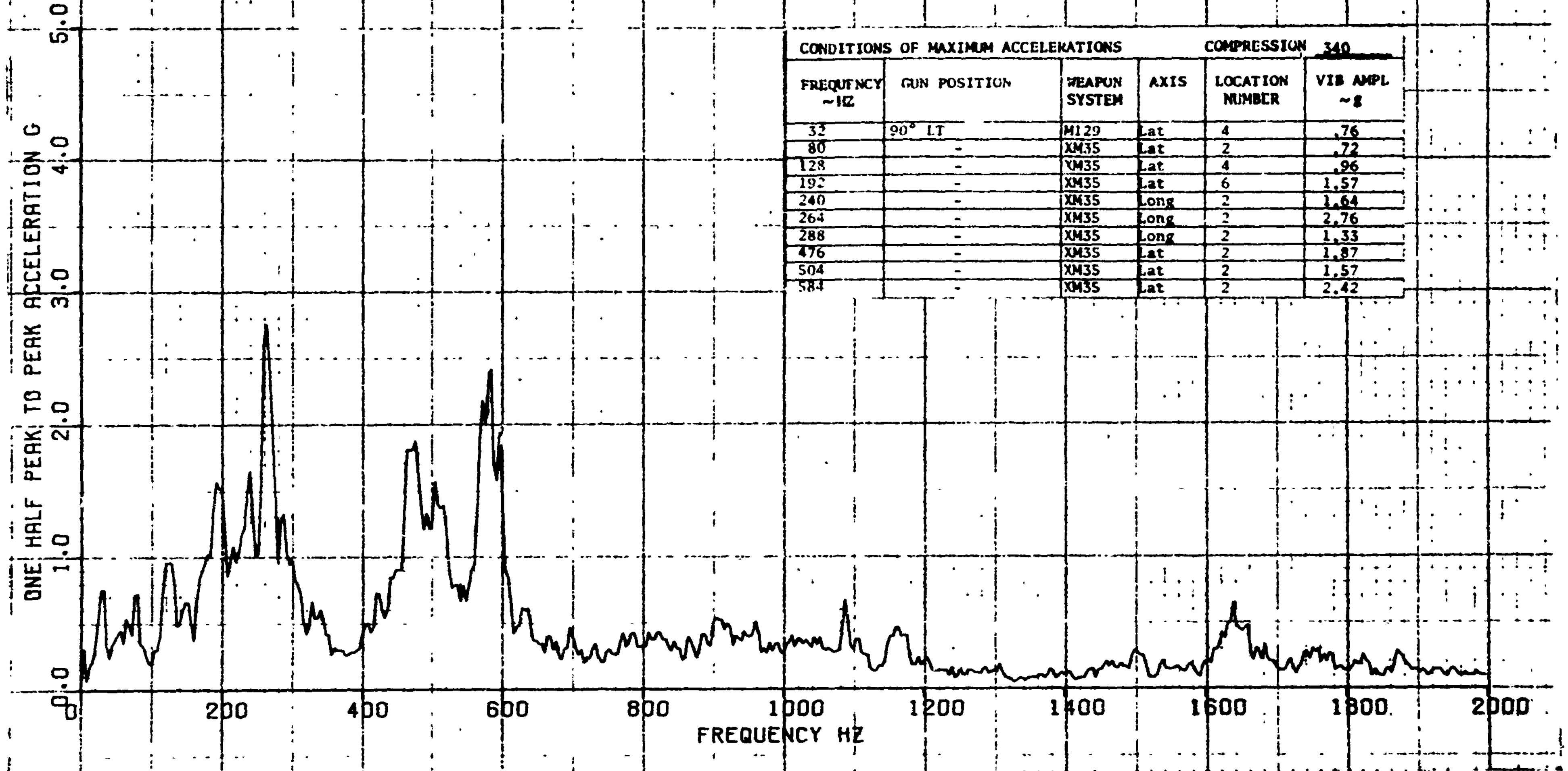


FIG 51
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS PILOT INSTR PNL-COMB AXIS VIB PLOT 338
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 52
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS PILOT PNL STRCT-COMB AXIS VIB PLOT 340
SENSOR LOC 2.4.6 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS				COMPRESSION 340	
FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
32	90° LT	M129	Lat	4	.76
80	-	XM35	Lat	2	.72
128	-	XM35	Lat	4	.96
192	-	XM35	Lat	6	1.57
240	-	XM35	Long	2	1.64
264	-	XM35	Long	2	2.76
288	-	XM35	Long	2	1.33
476	-	XM35	Lat	2	1.87
504	-	XM35	Lat	2	1.57
584	-	XM35	Lat	2	2.42

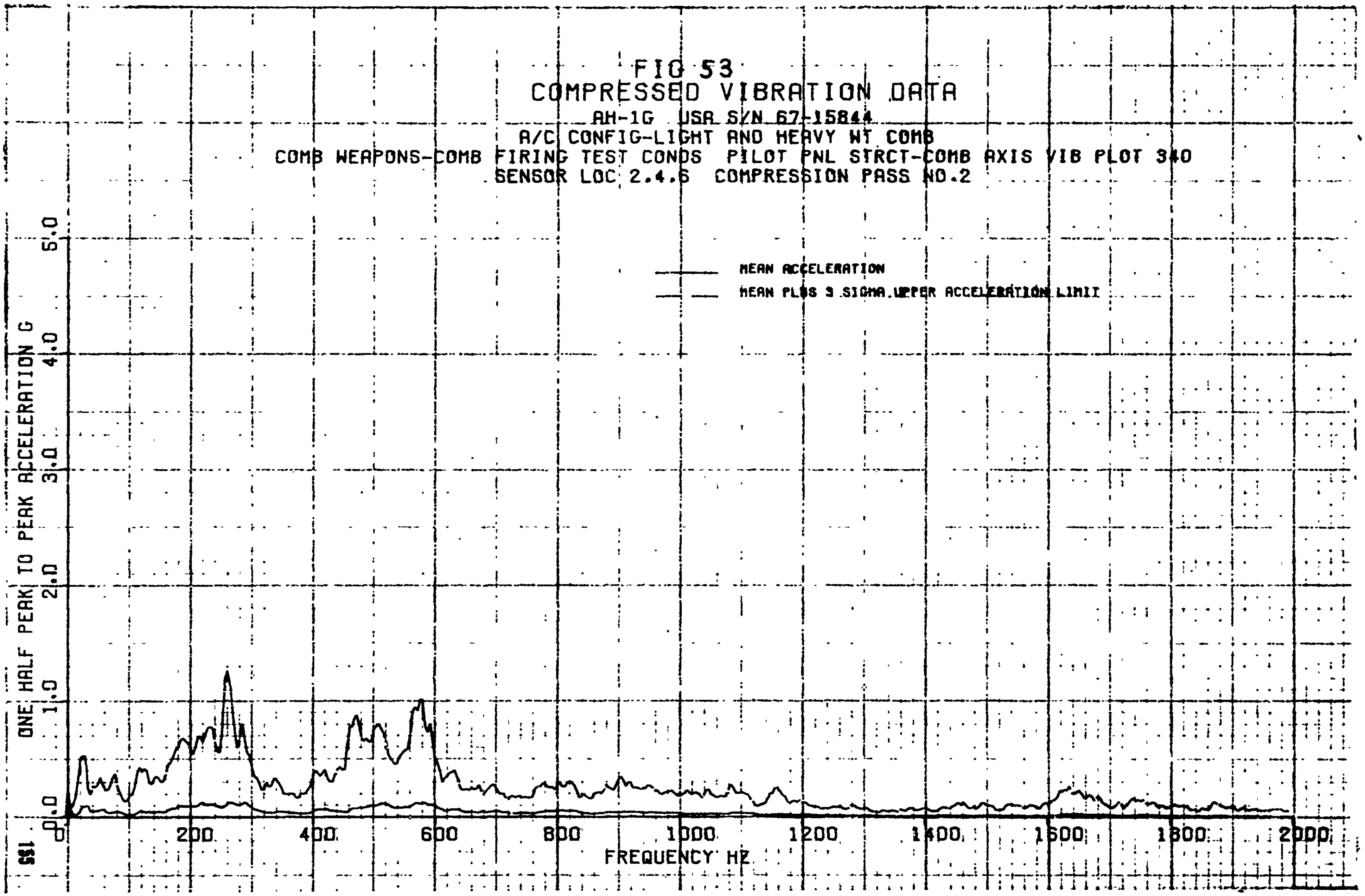


FIG 53
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS PILOT PNL STRCT-COMB AXIS VIB PLOT 340
SENSOR LOC 2.4.6 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 54

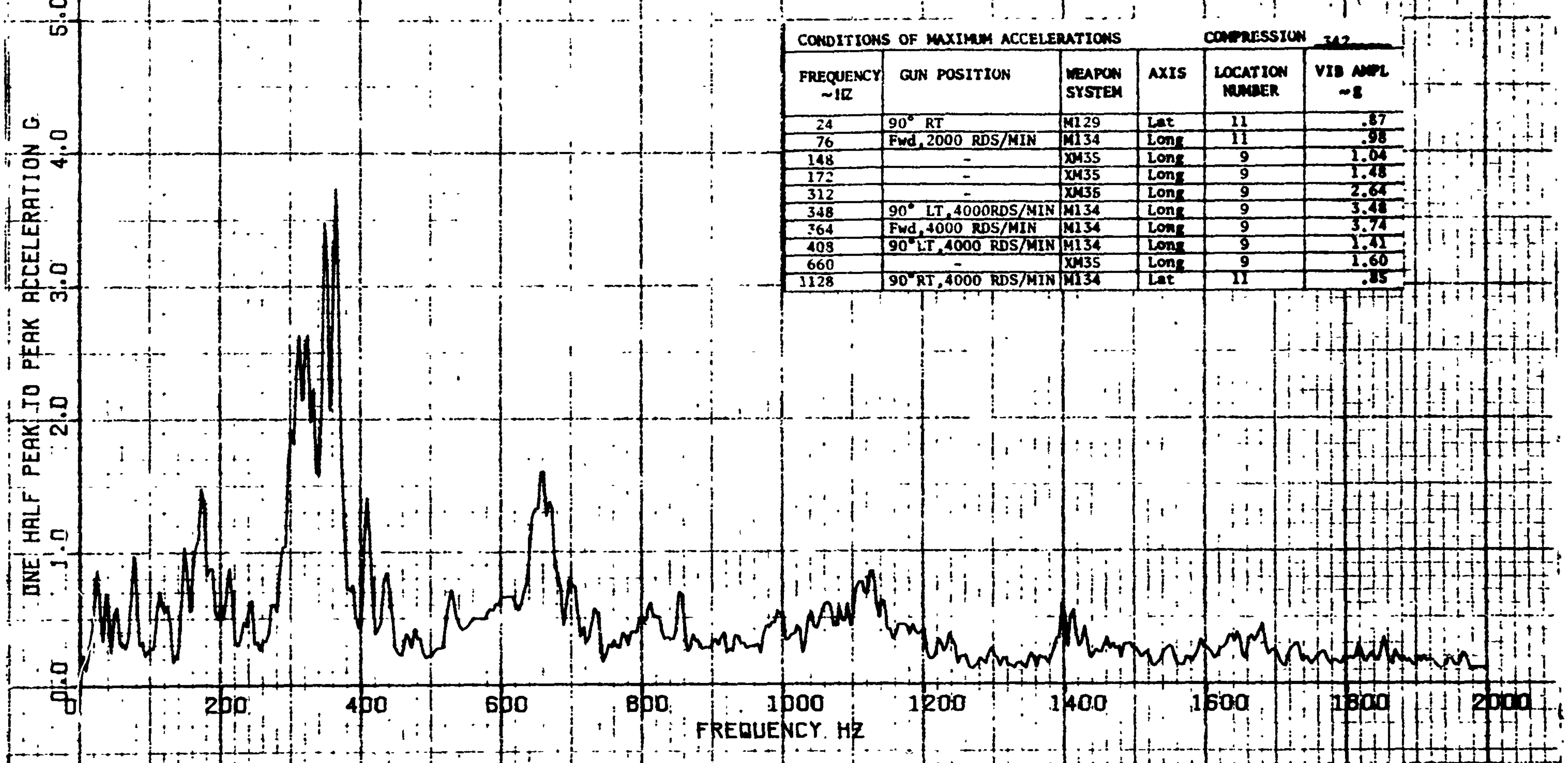
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB WEAPONS-COMB FIRING TEST CONDS GUNNER INSTR PNL-COMB AXIS VIB PLOT 342

SENSOR LOC 9.11.13 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 342

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
24	90° RT	M129	Lat	11	.87
76	Fwd,2000 RDS/MIN	M134	Long	11	.98
148	-	XM35	Long	9	1.04
172	-	XM35	Long	9	1.48
312	-	XM36	Long	9	2.64
348	90° LT,4000RDS/MIN	M134	Long	9	3.48
364	Fwd,4000 RDS/MIN	M134	Long	9	3.74
408	90° LT,4000 RDS/MIN	M134	Long	9	1.41
660	-	XM35	Long	9	1.60
1128	90° RT,4000 RDS/MIN	M134	Lat	11	.85

FIG 55
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS GUNNER INSTR PNL-COMB AXIS VIB PLOT 342
SENSOR LOC 9.11.13 COMPRESSION PASS NO.2

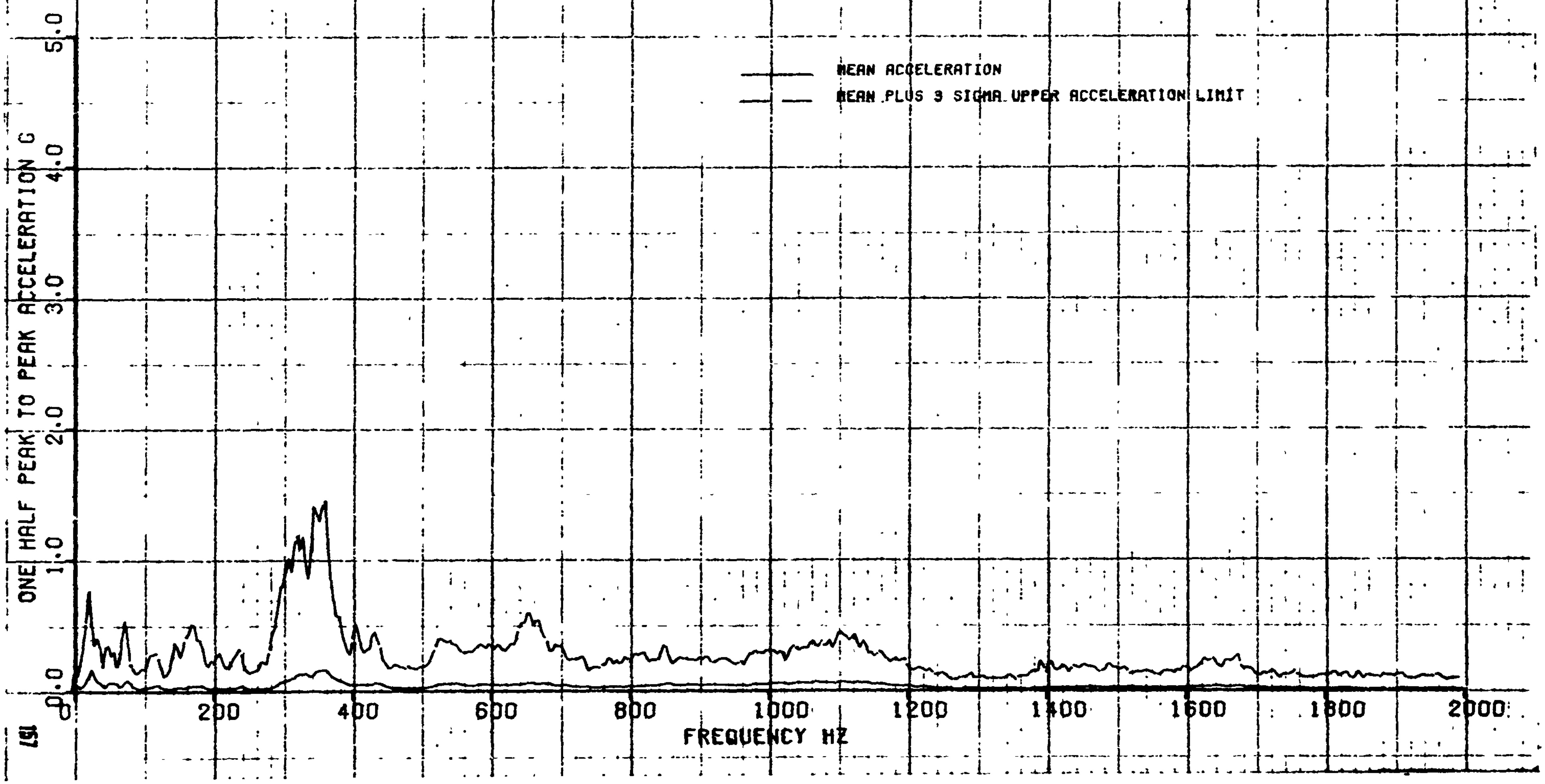


FIG 56

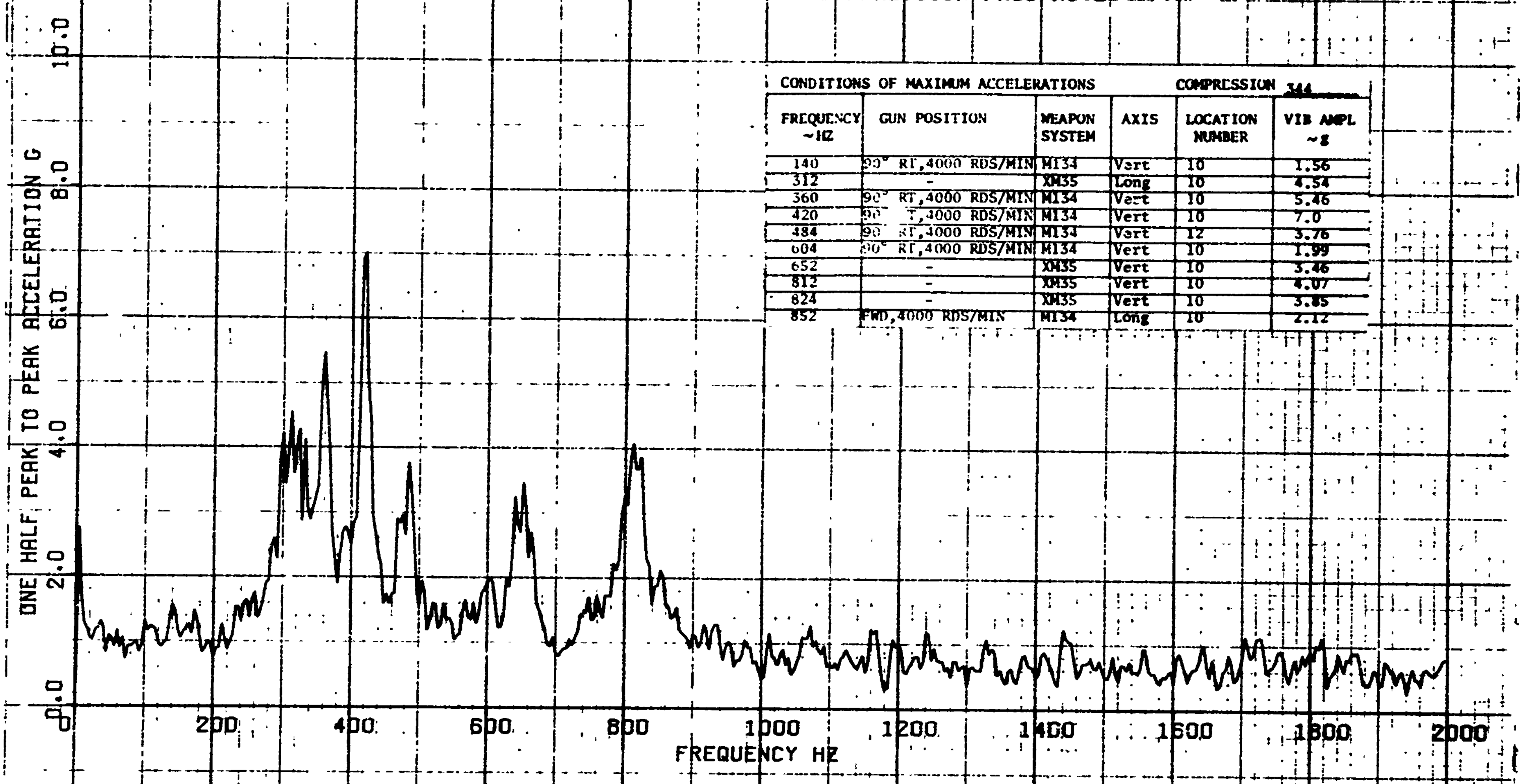
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB WEAPONS-COMB FIRING TEST CONDS GUNNER PNL STRCT-COMB AXIS VIB PLOT 344

SENSOR LOC 10.12 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 344

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
140	90° RT,4000 RDS/MIN	M134	Vert	10	1.56
312	-	XM35	Long	10	4.54
360	90° RT,4000 RDS/MIN	M134	Vert	10	5.46
420	90° RT,4000 RDS/MIN	M134	Vert	10	7.0
484	90° RT,4000 RDS/MIN	M134	Vert	12	3.76
604	90° RT,4000 RDS/MIN	M134	Vert	10	1.99
652	-	XM35	Vert	10	3.46
812	-	XM35	Vert	10	4.07
824	-	XM35	Vert	10	3.85
852	FWD,4000 RDS/MIN	M134	Long	10	2.12

FIG 57
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS GUNNER PNL STRCT-COMB AXIS VIB PLOT 344
SENSOR LOC 10.12 COMPRESSION PASS NO.2

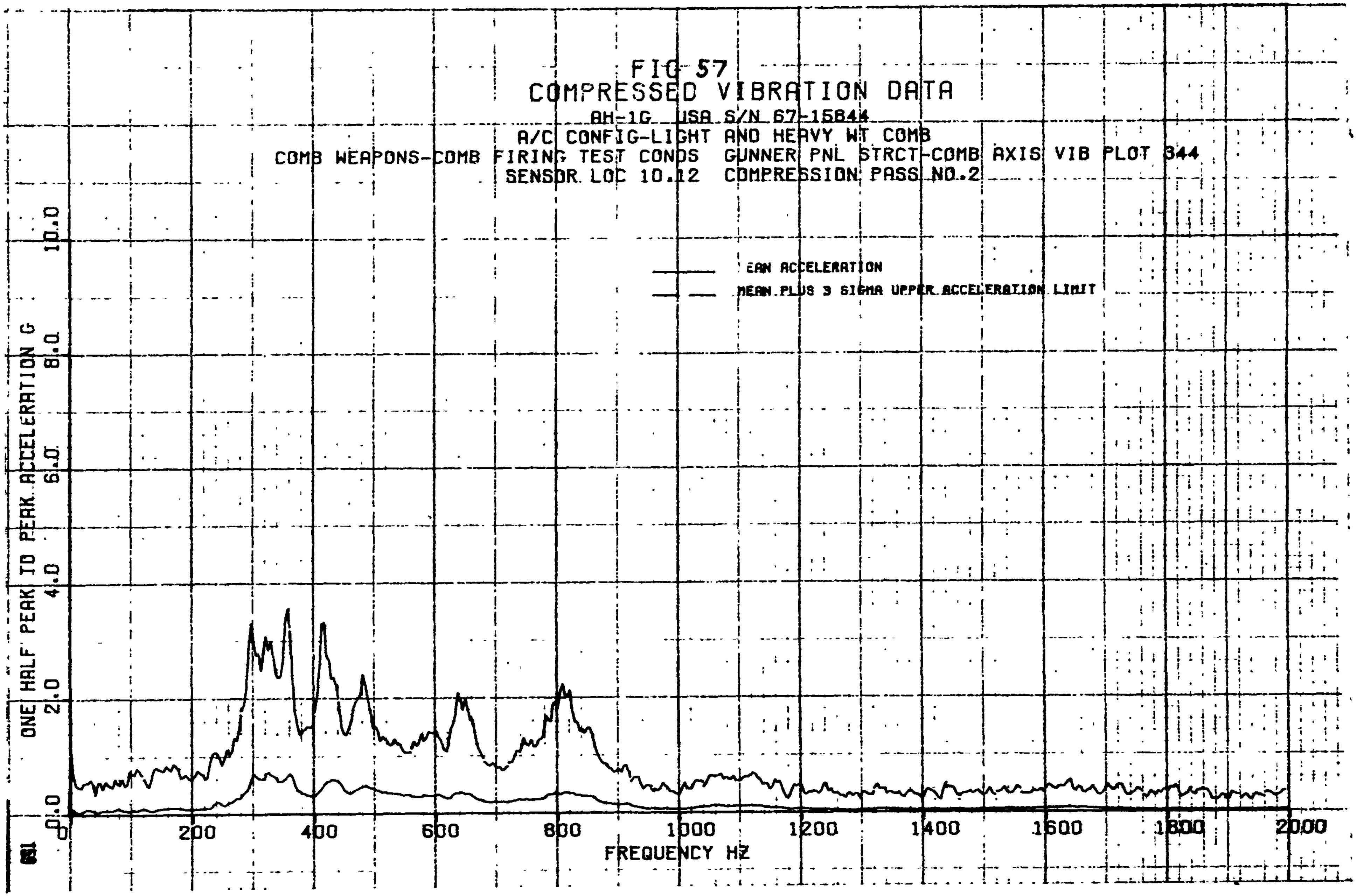


FIG 58

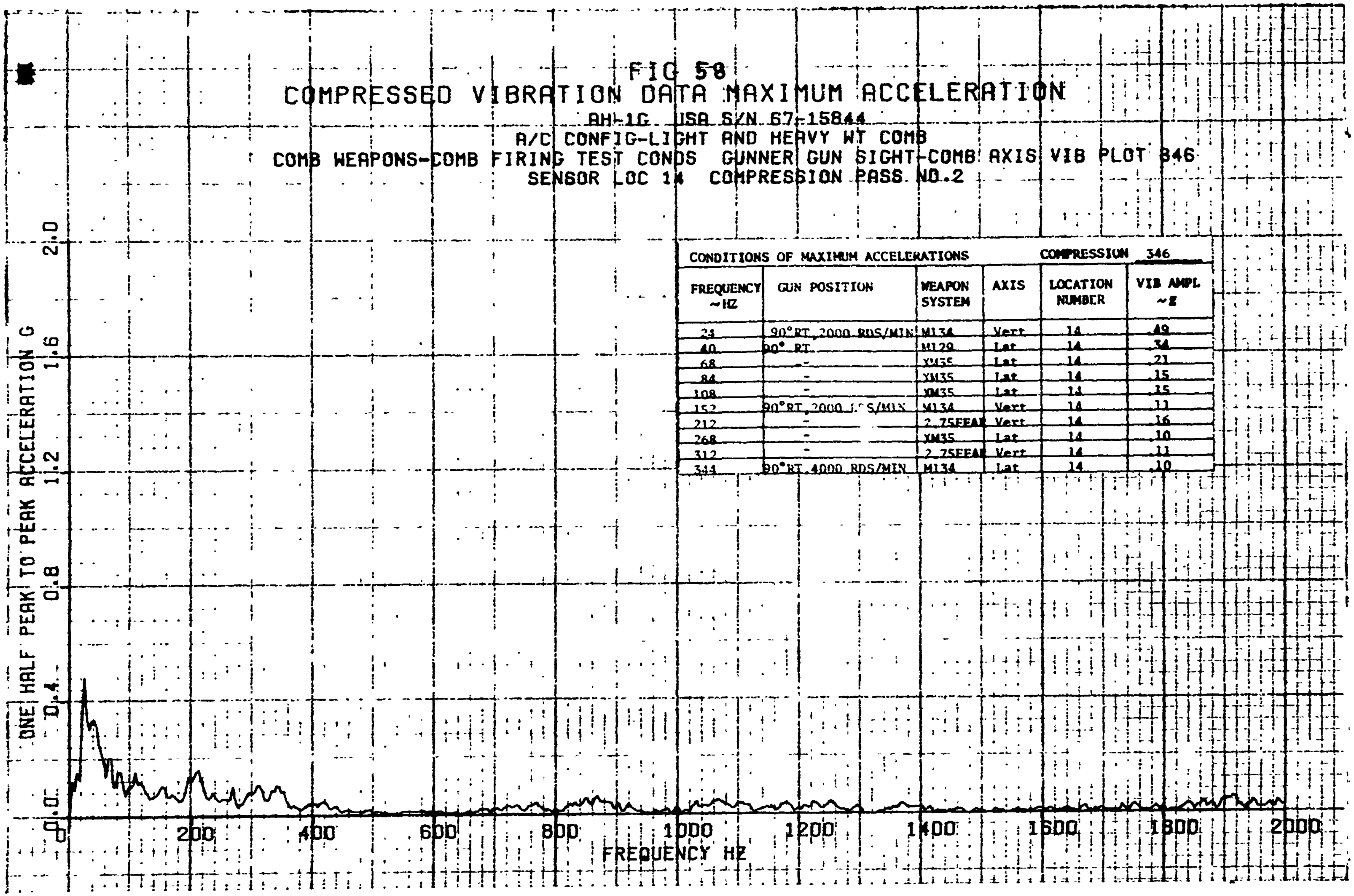
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB WEAPONS-COMB FIRING TEST CONDS GUNNER GUN SIGHT-COMB AXIS VIB PLOT 346

SENSOR LOC 14 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 346

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
24	90°RT 2000 RDS/MIN	M134	Vert	14	.49
40	90° RT	M129	Lat	14	.34
68	-	XM35	Lat	14	.21
84	-	XM35	Lat	14	.15
108	-	XM35	Lat	14	.15
152	90°RT 2000 [illegible]S/MIN	M134	Vert	14	.11
212	-	2.75FFAR	Vert	14	.16
268	-	XM35	Lat	14	.10
312	-	2.75FFAR	Vert	14	.11
344	90°RT 4000 RDS/MIN	M134	Lat	14	.10

FIG 59
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS GUNNER GUN SIGHT-COMB AXIS VIB PLOT 346
SENSOR LOC 14 COMPRESSION PASS NO.2

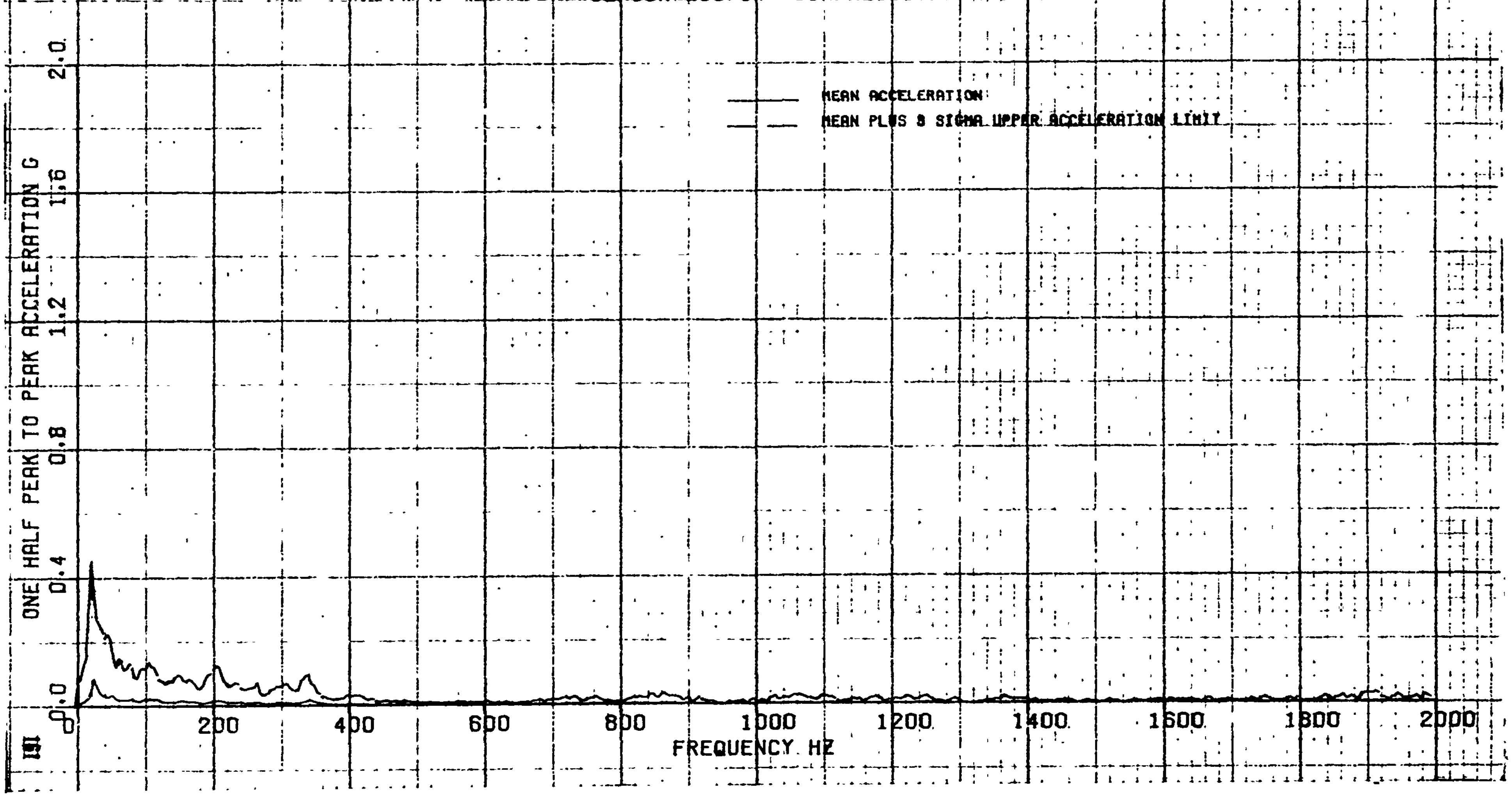
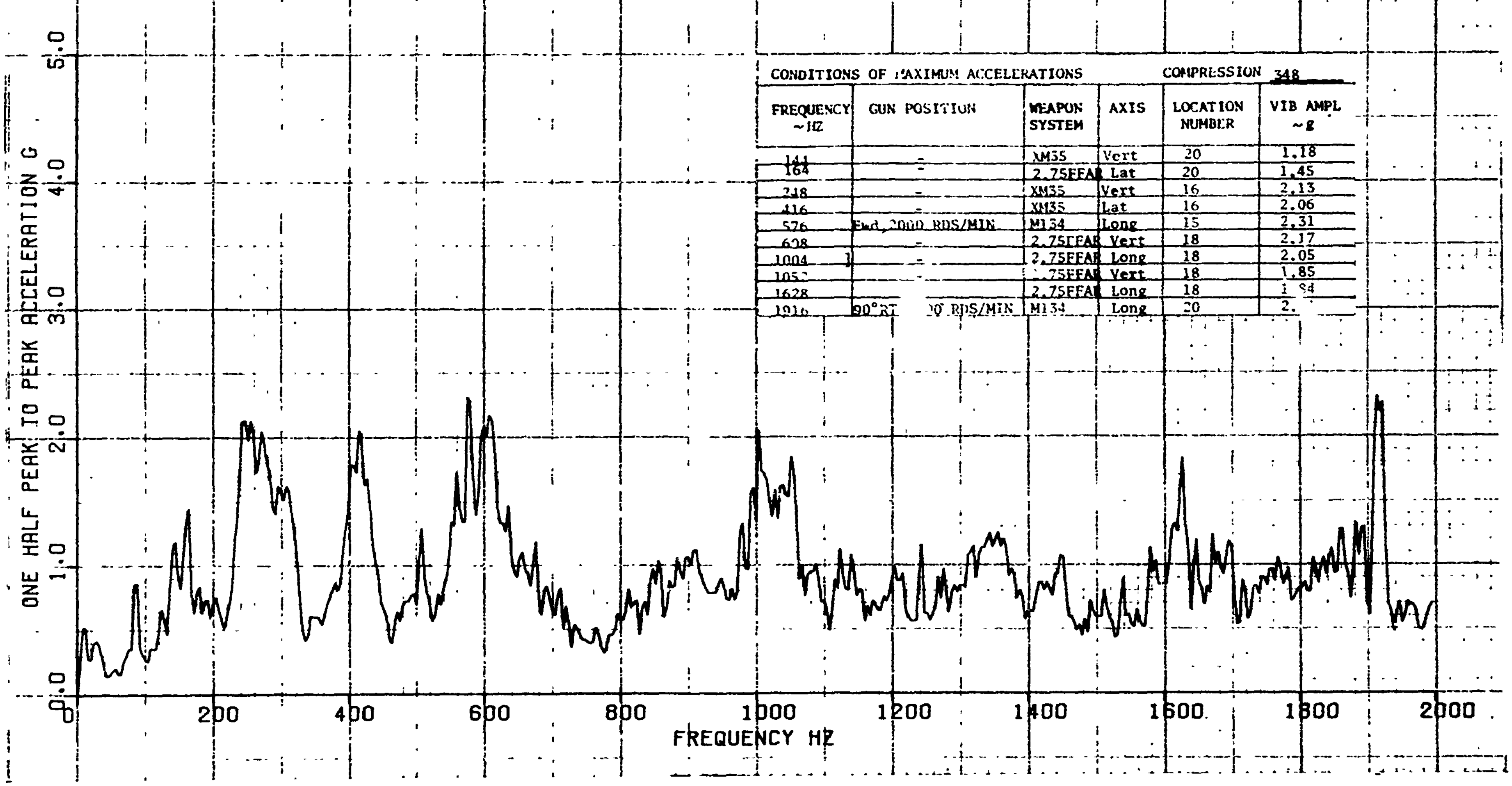


FIG 60
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS AVIONICS EQUIP-COMB AXIS VIB PLOT 348
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 348

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
141	-	XM35	Vert	20	1.18
164	-	2.75FFAR	Lat	20	1.45
248	-	XM35	Vert	16	2.13
416	-	XM35	Lat	16	2.06
576	Fwd, 2000 RDS/MIN	M134	Long	15	2.31
608	-	2.75FFAR	Vert	18	2.17
1004	-	2.75FFAR	Long	18	2.05
1052	-	2.75FFAR	Vert	18	1.85
1628	-	2.75FFAR	Long	18	1.94
1916	90° RT [illegible]0 RDS/MIN	M134	Long	20	2.[illegible]

FIG 61
COMPRESSED VIBRATION DATA
AH-1G USB S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS AVIONICS EQUIP-COMB AXIS VIB PLOT 348
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.2

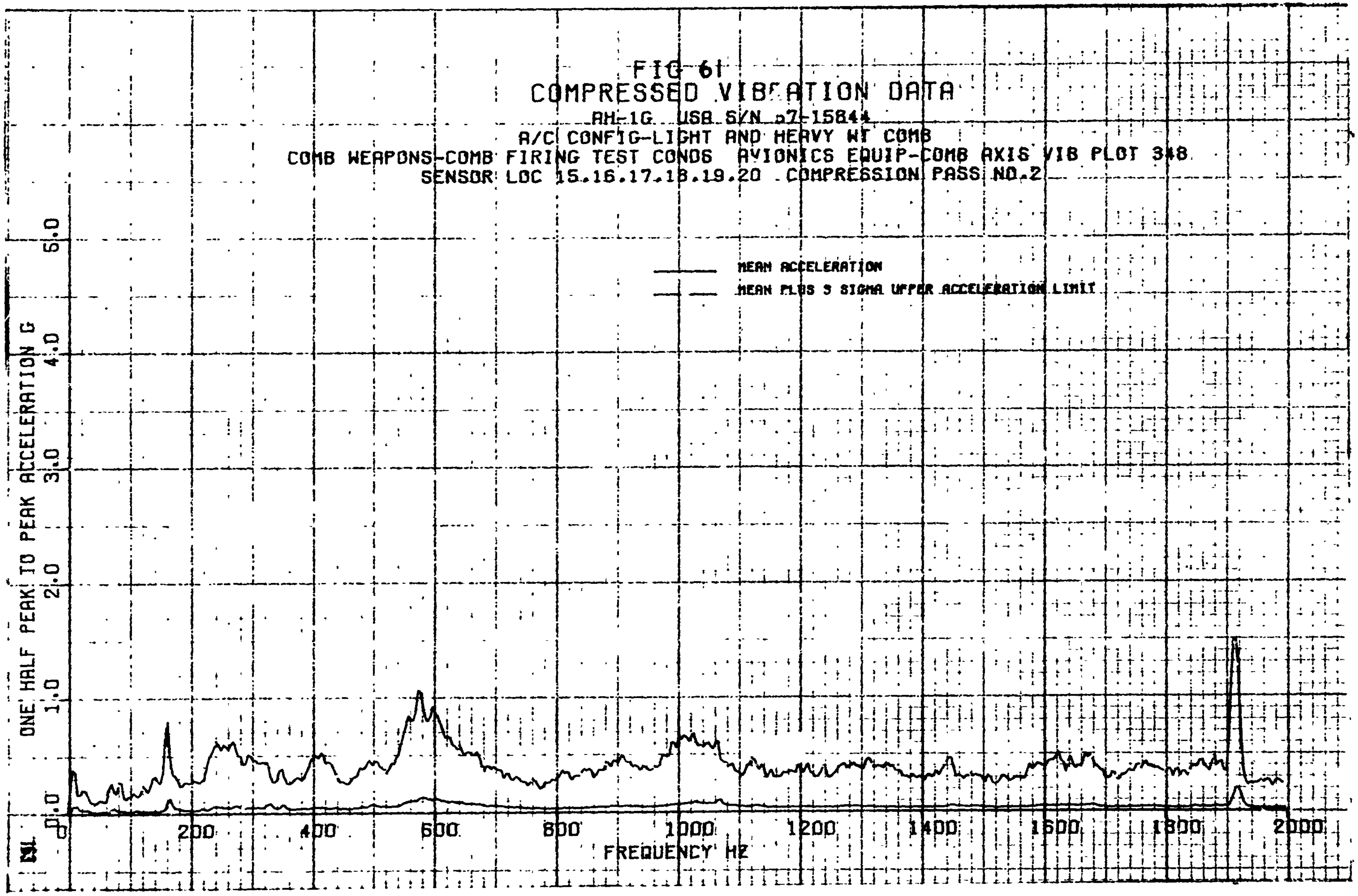
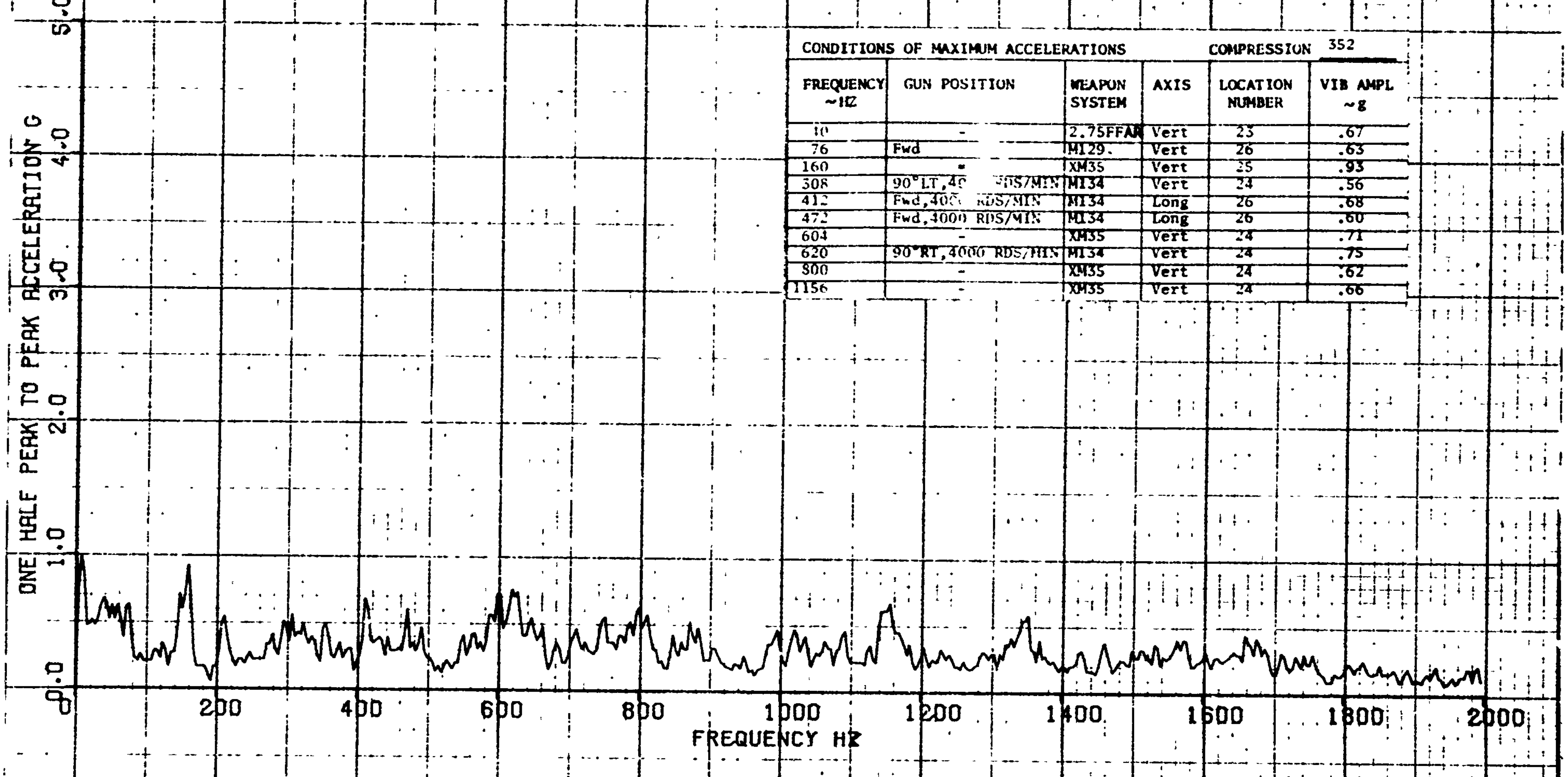


FIG 62
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS PILOT INPUT-COMB AXIS VIB PLOT 352
SENSOR LOC 22,23,24,25,26 COMPRESSION PASS NO.2

CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 352

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
10	-	2.75FFAR	Vert	23	.67
76	Fwd	M129.	Vert	26	.63
160	-	XM35	Vert	25	.93
308	90°LT,40[illegible] RDS/MIN	M134	Vert	24	.56
412	Fwd,40[illegible] RDS/MIN	M134	Long	26	.68
472	Fwd,4000 RDS/MIN	M134	Long	26	.60
604	-	XM35	Vert	24	.71
620	90°RT,4000 RDS/MIN	M134	Vert	24	.75
800	-	XM35	Vert	24	.62
1156	-	XM35	Vert	24	.66



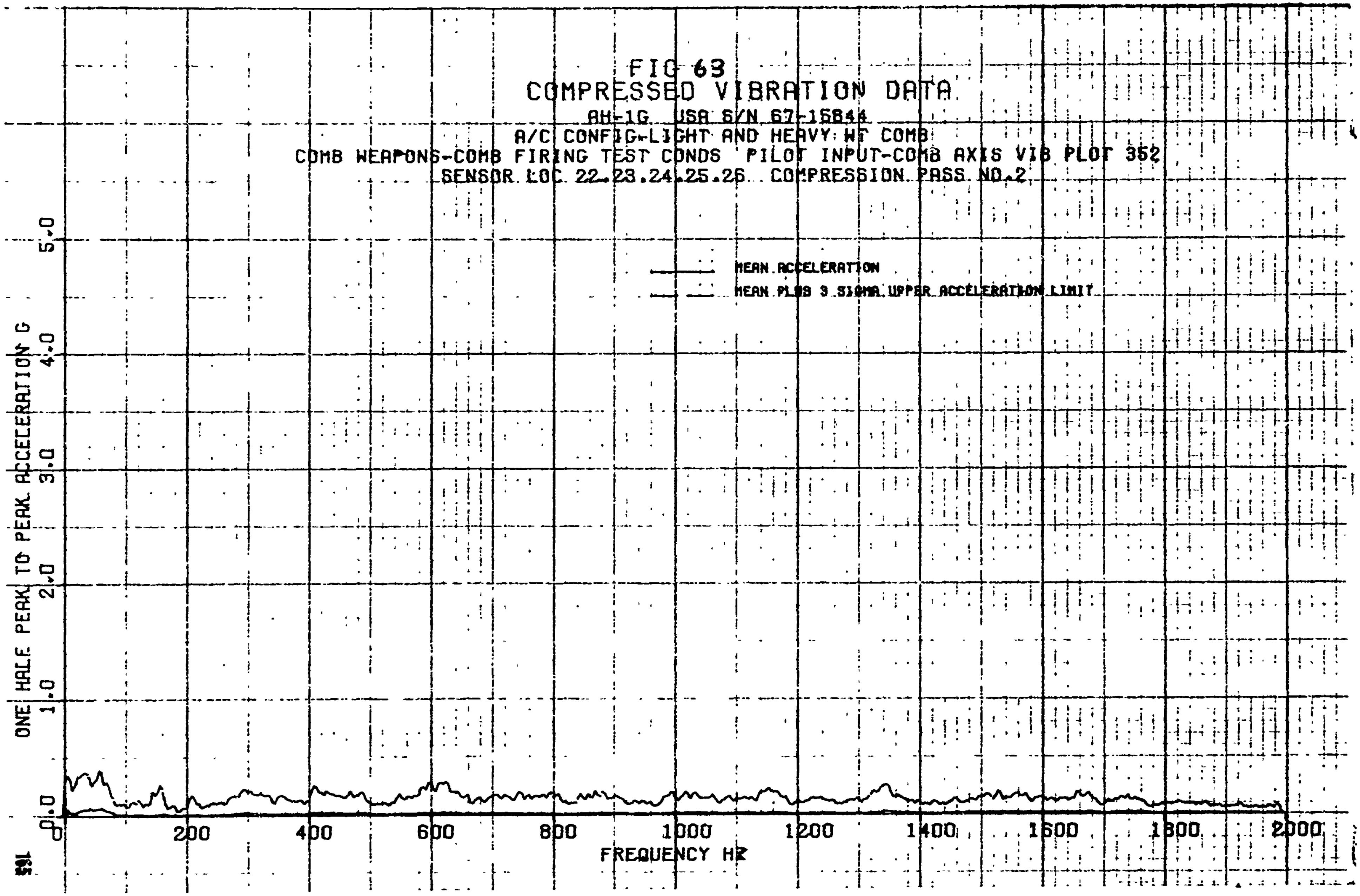


FIG 63
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS PILOT INPUT-COMB AXIS VIB PLOT 352
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.2

FIG 64

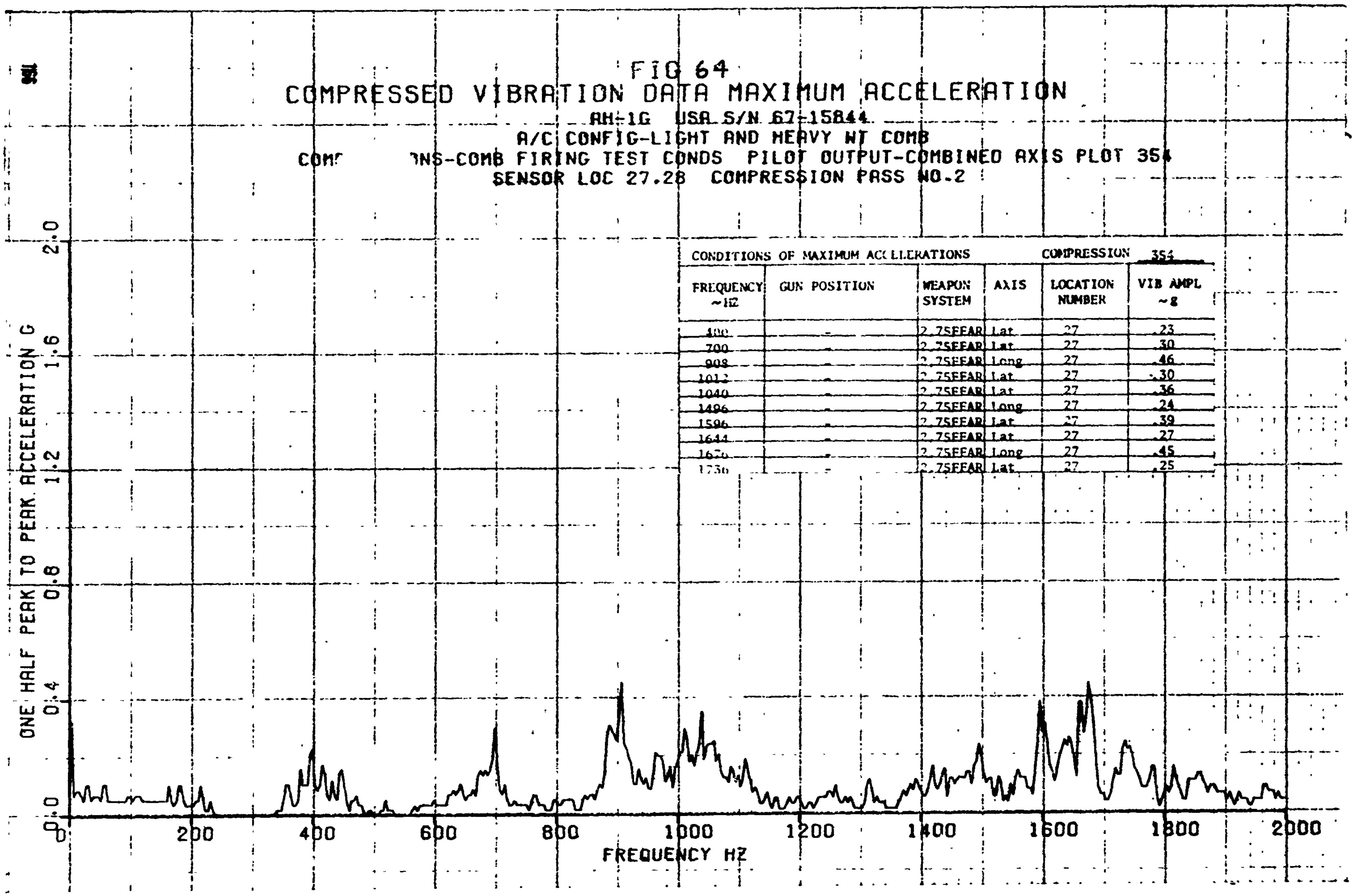
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMF ?NS-COMB FIRING TEST CONDS PILOT OUTPUT-COMBINED AXIS PLOT 354

SENSOR LOC 27.28 COMPRESSION PASS NO-2



CONDITIONS OF MAXIMUM ACCELERATIONS COMPRESSION 354

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
400	-	2.75FFAR	Lat	27	.23
700	-	2.75FFAR	Lat	27	.30
908	-	2.75FFAR	Long	27	.46
1012	-	2.75FFAR	Lat	27	.30
1040	-	2.75FFAR	Lat	27	.36
1496	-	2.75FFAR	Long	27	.24
1596	-	2.75FFAR	Lat	27	.39
1644	-	2.75FFAR	Lat	27	.27
1676	-	2.75FFAR	Long	27	.45
1736	-	2.75FFAR	Lat	27	.25

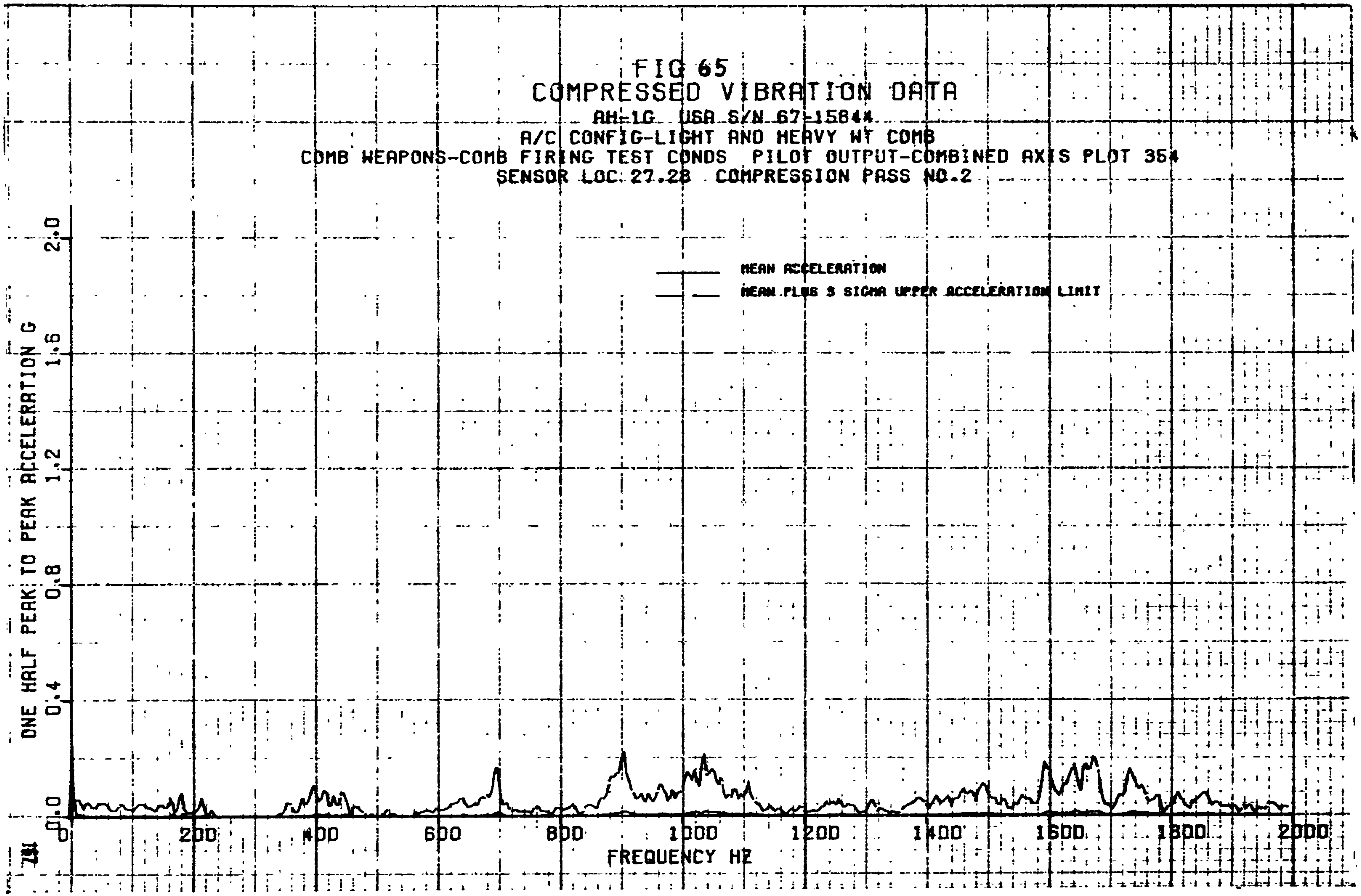
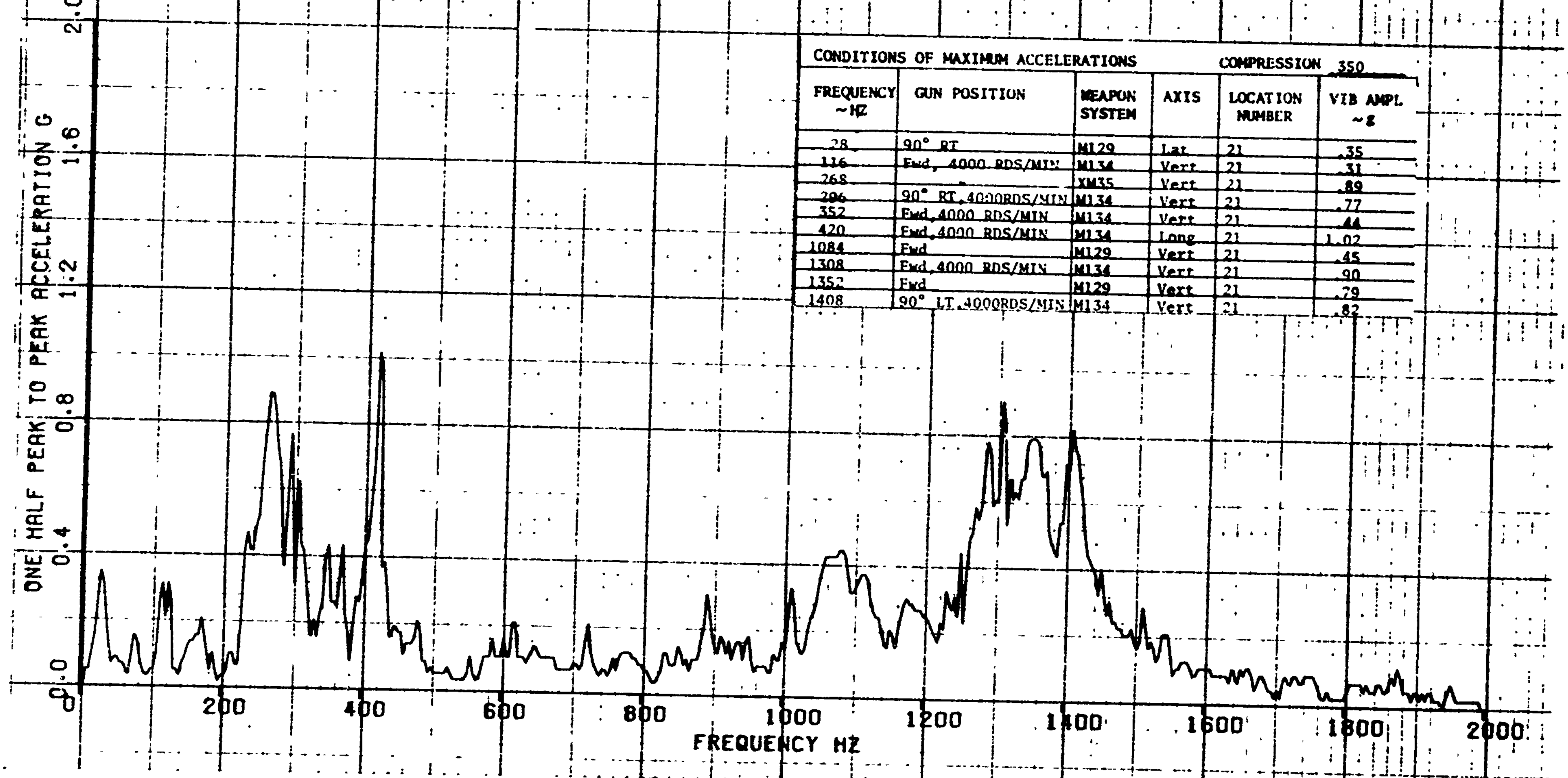


FIG 65
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS PILOT OUTPUT-COMBINED AXIS PLOT 354
SENSOR LOC 27.28 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 66
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS GUNNER SEAT-COMB AXIS VIB PLOT 350
SENSOR LOC 21 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 350

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
28	90° RT	M129	Lat	21	.35
116	Fwd, 4000 RDS/MIN	M134	Vert	21	.31
268		XM35	Vert	21	.89
296	90° RT, 4000RDS/MIN	M134	Vert	21	.77
352	Fwd, 4000 RDS/MIN	M134	Vert	21	.44
420	Fwd, 4000 RDS/MIN	M134	Long	21	1.02
1084	Fwd	M129	Vert	21	.45
1308	Fwd, 4000 RDS/MIN	M134	Vert	21	.90
1352	Fwd	M129	Vert	21	.79
1408	90° LT, 4000RDS/MIN	M134	Vert	21	.82

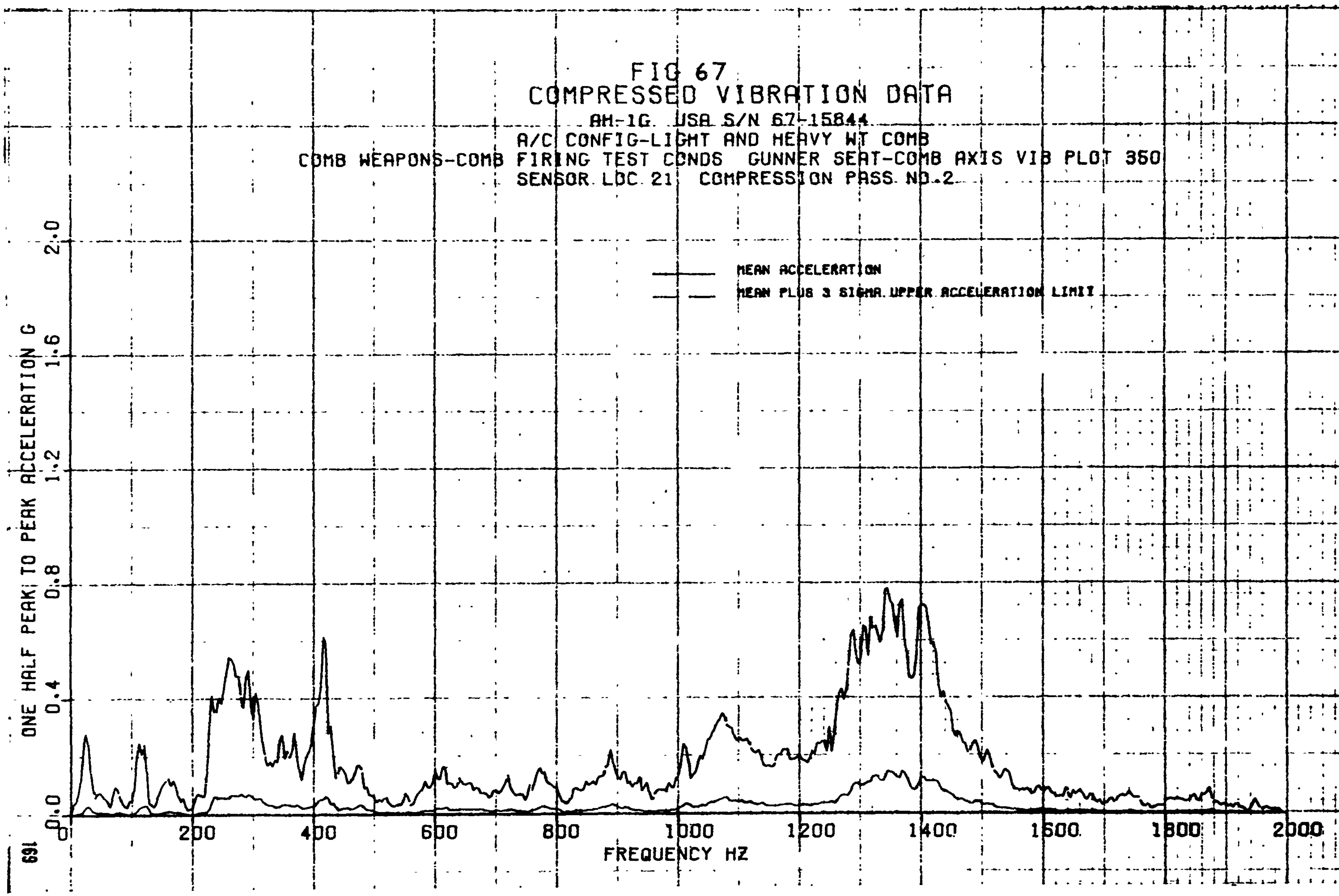


FIG 67
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS GUNNER SEAT-COMB AXIS VIB PLOT 350
SENSOR LOC 21 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 68

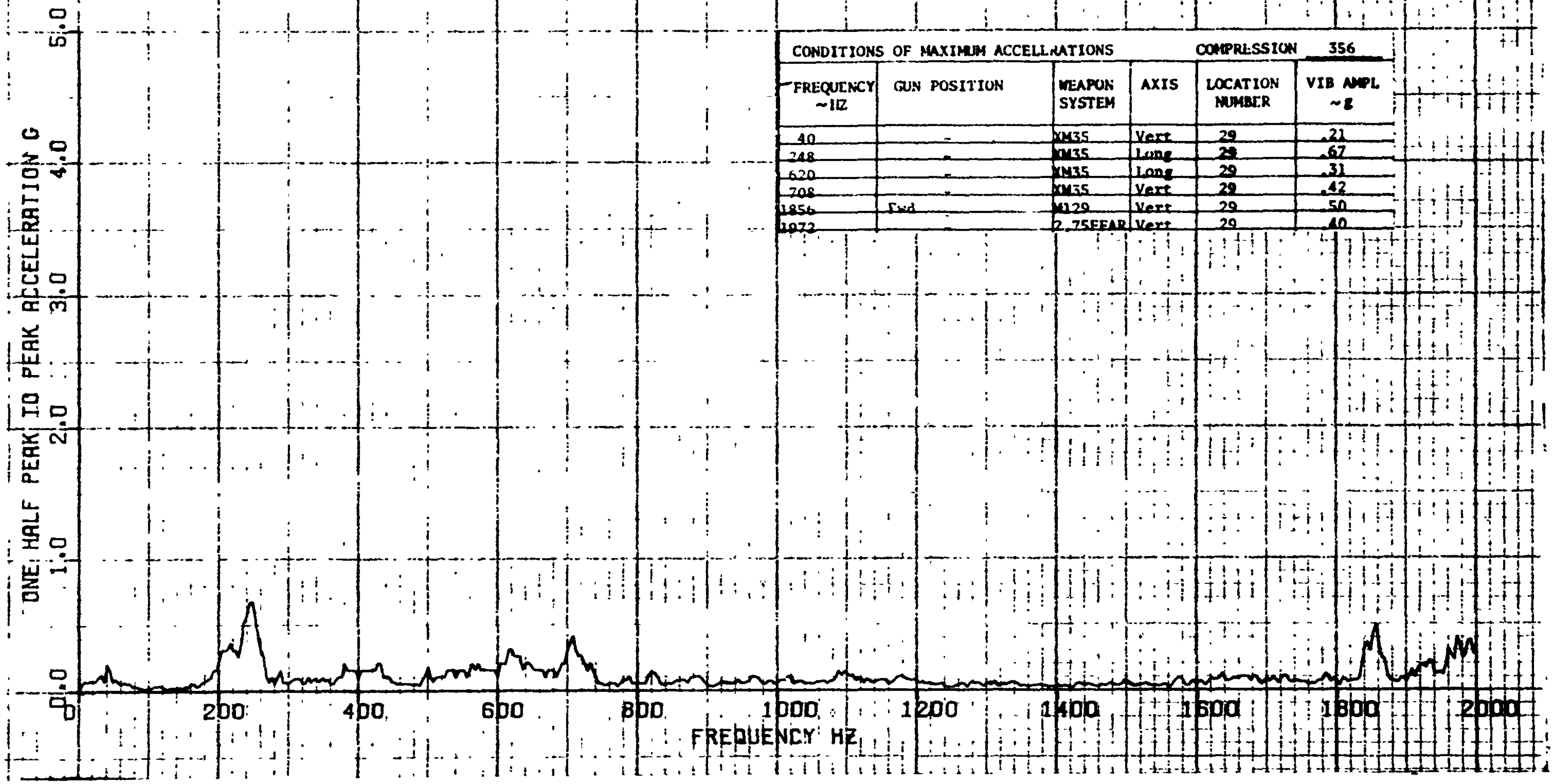
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMP

COMB WEAPONS-COMB FIRING TEST CONDS LIFT LINK-COMBINED AXIS VIB PLOT 356

SENSOR LOC 29 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELLRATIONS — COMPRESSION 356

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
40	-	XM35	Vert	29	.21
248	-	XM35	Long	29	.67
620	-	XM35	Long	29	.31
708	-	XM35	Vert	29	.42
1856	Fwd	M129	Vert	29	.50
1972	-	2.75FFAR	Vert	29	.40

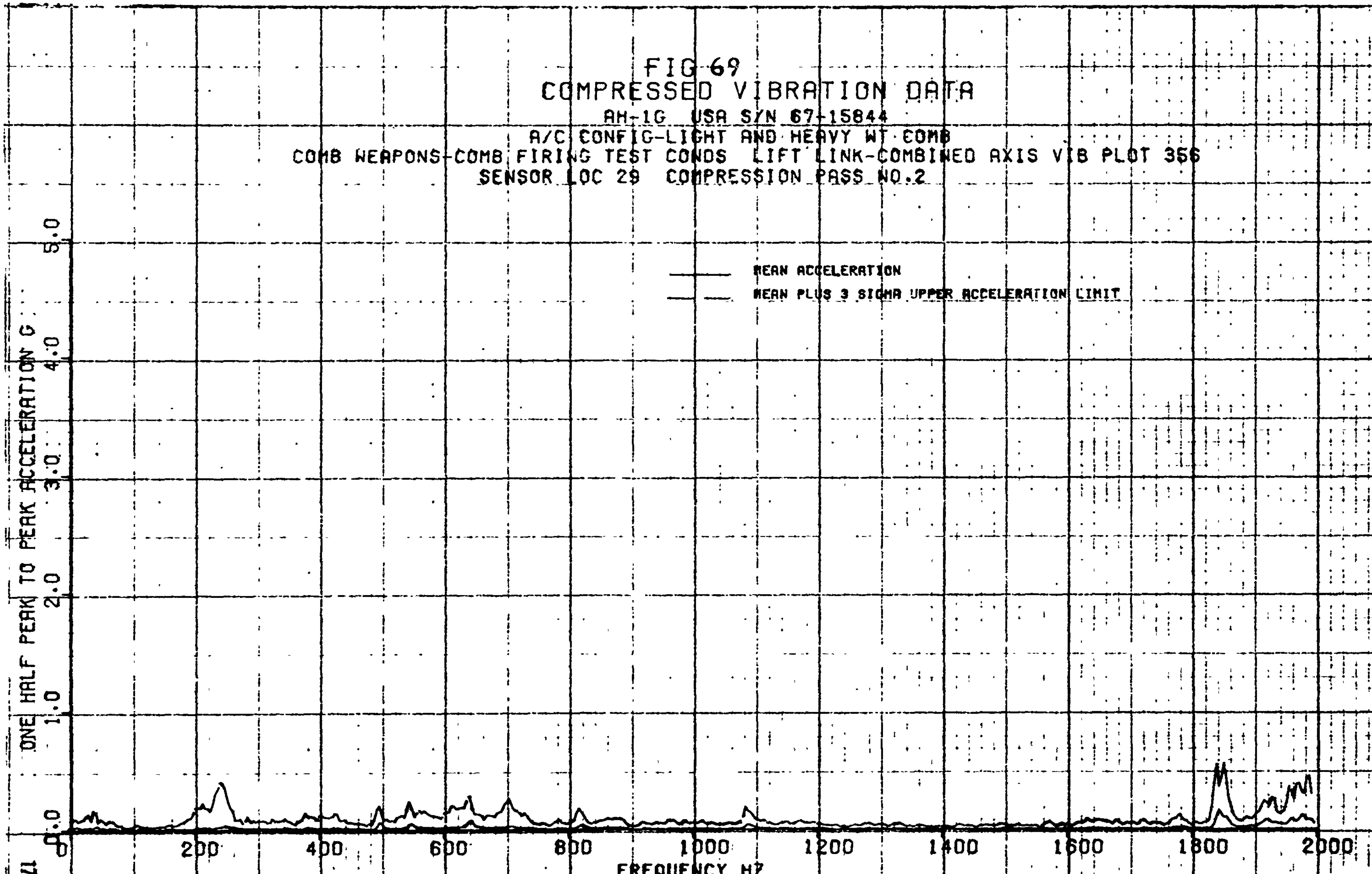


FIG 69
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS LIFT LINK-COMBINED AXIS VIB PLOT 356
SENSOR LOC 29 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 70

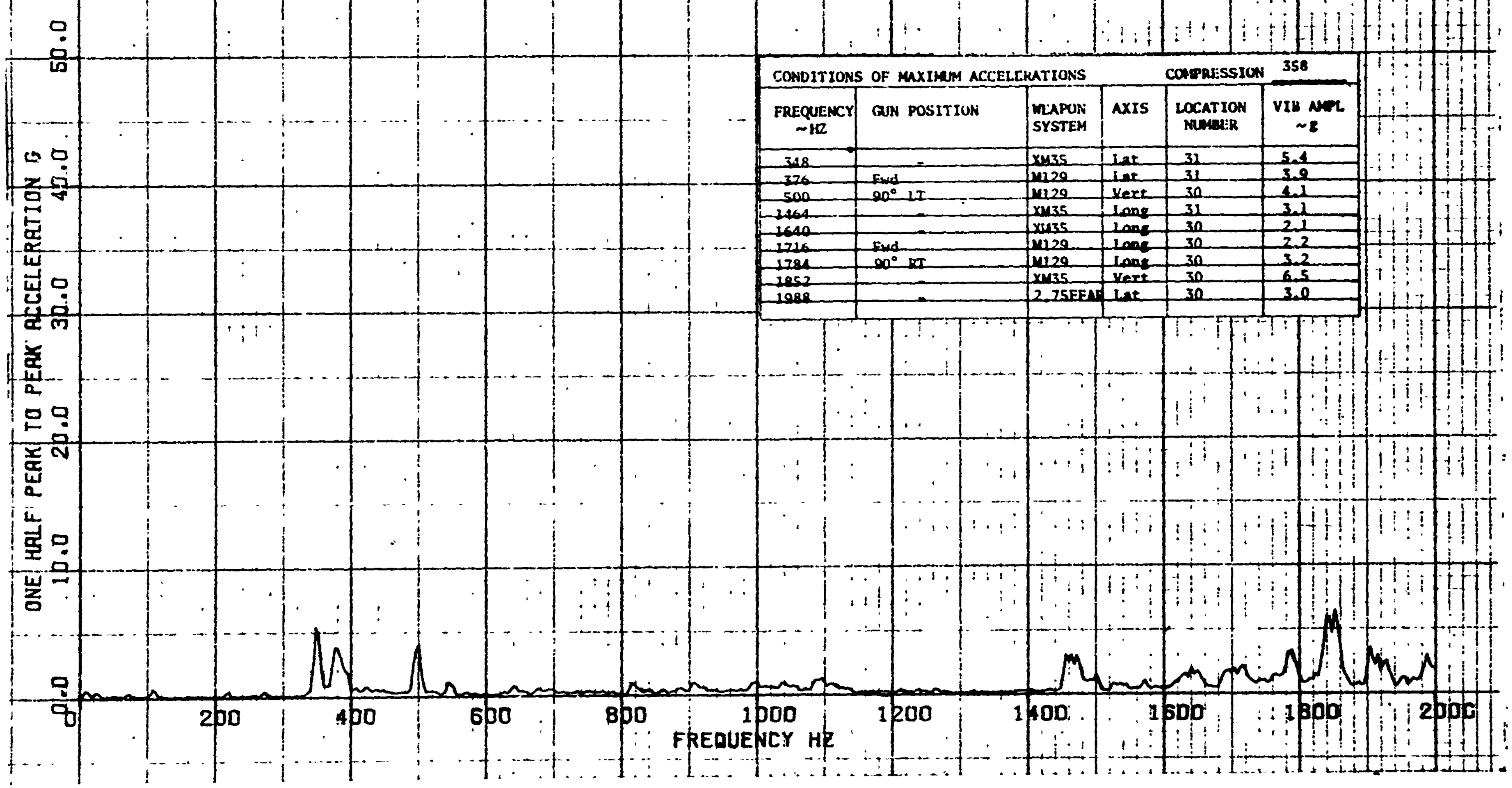
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB WEAPONS-COMB FIRING TEST CONDS NR,N1,N2 TACH GEN-COMB AXIS VIB PLOT 358

SENSOR LOC 30,31 32 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 358

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
348	-	XM35	Lat	31	5.4
376	Fwd	M129	Lat	31	3.9
500	90° LT	M129	Vert	30	4.1
1464	-	XM35	Long	31	3.1
1640	-	XM35	Long	30	2.1
1716	Fwd	M129	Long	30	2.2
1784	90° RT	M129	Long	30	3.2
1852	-	XM35	Vert	30	6.5
1988	-	2.75FFAR	Lat	30	3.0

FIG 71
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS NR,N1,N2 TACH GEN-COMB AXIS VIB PLOT 858
SENSOR LOC 80,31,32 COMPRESSION PASS NO.2

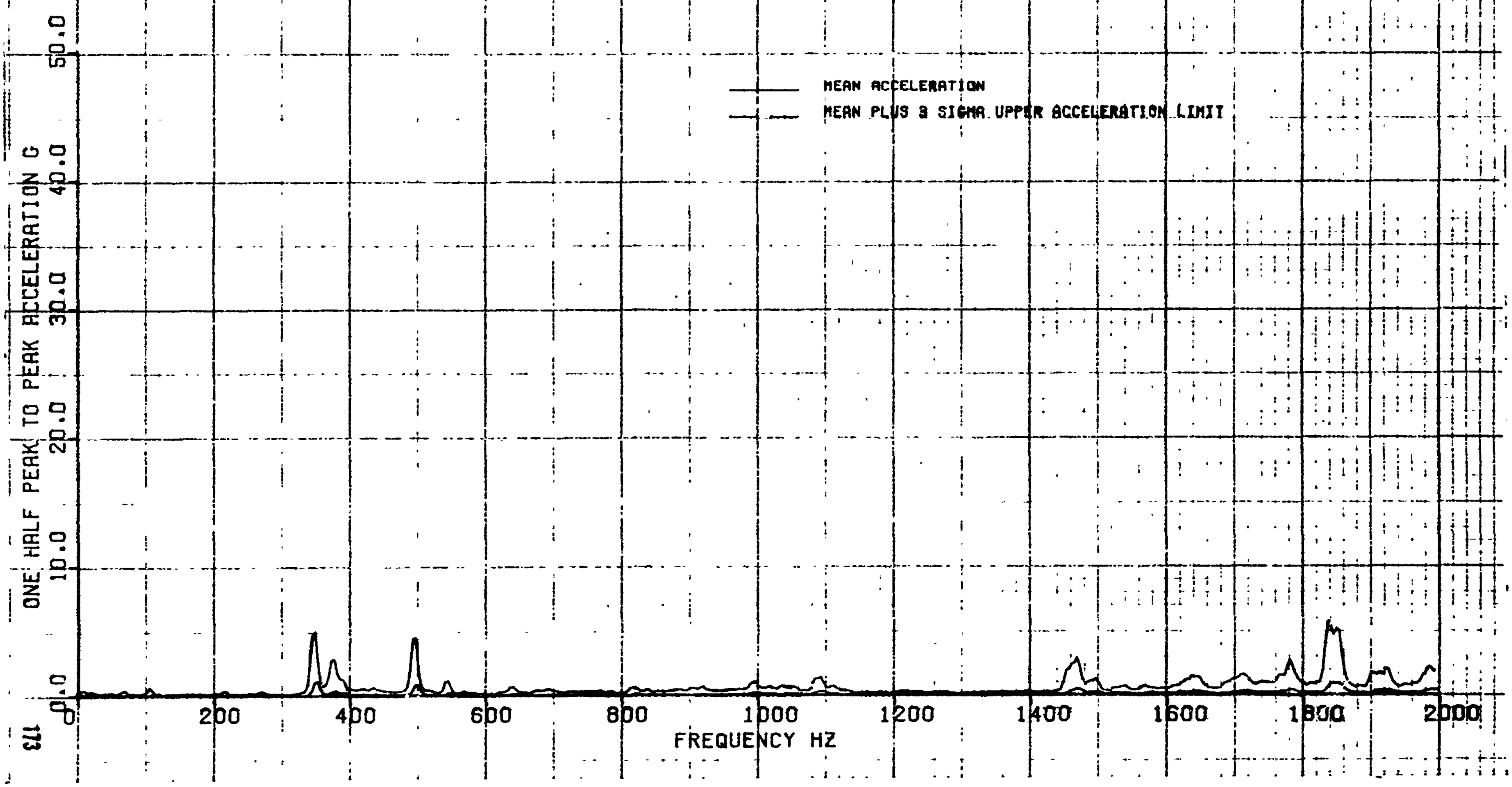
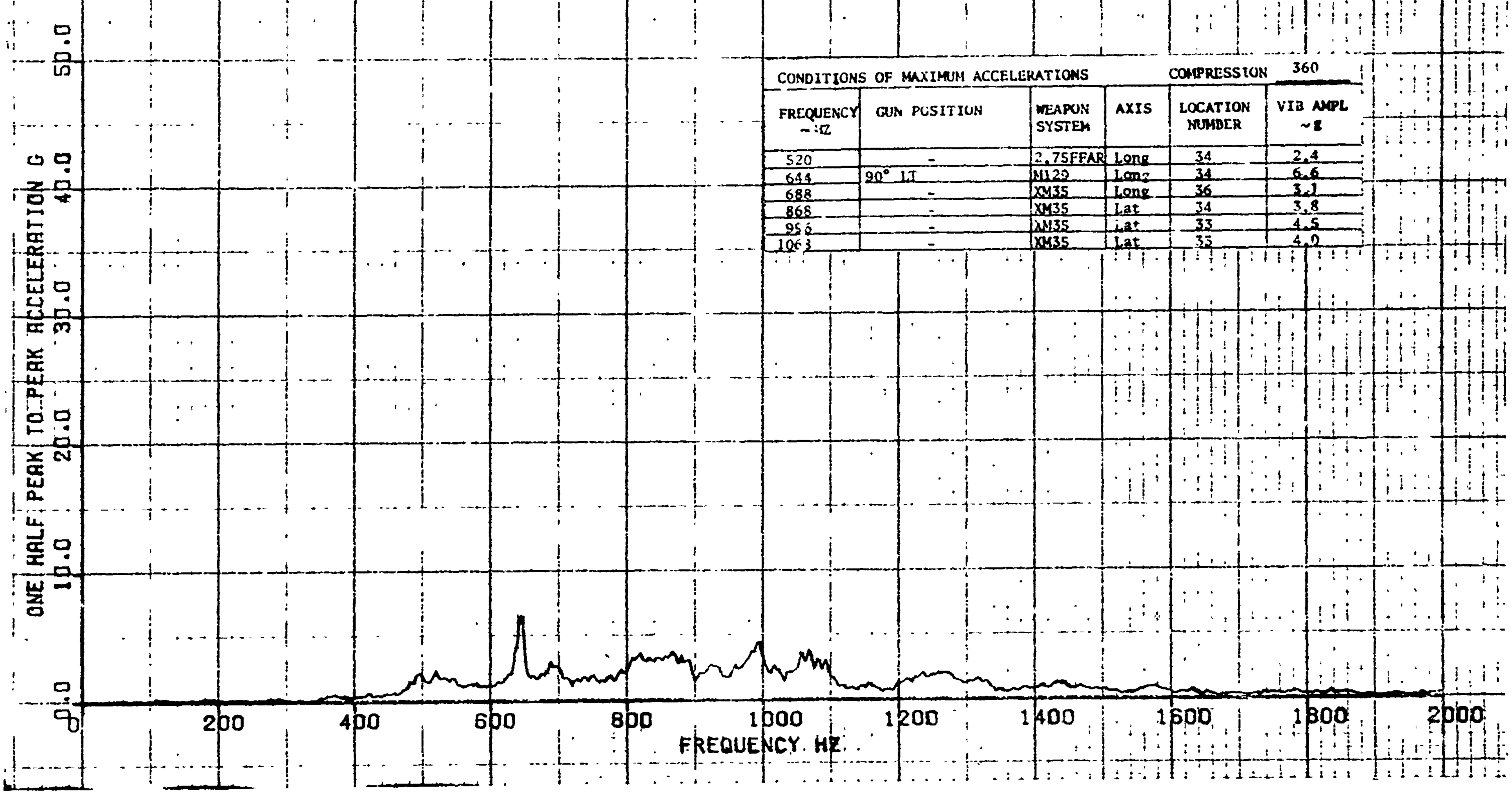


FIG 72
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67 15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS TRANS MOUNTS-COMB AXIS VIB PLOT 360
SENSOR LOC 33,34,35,36 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 360

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
520	-	2.75FFAR	Long	34	2.4
644	90° LT	M129	Long	34	6.6
688	-	XM35	Long	36	3.1
868	-	XM35	Lat	34	3.8
956	-	XM35	Lat	33	4.5
1063	-	XM35	Lat	33	4.0

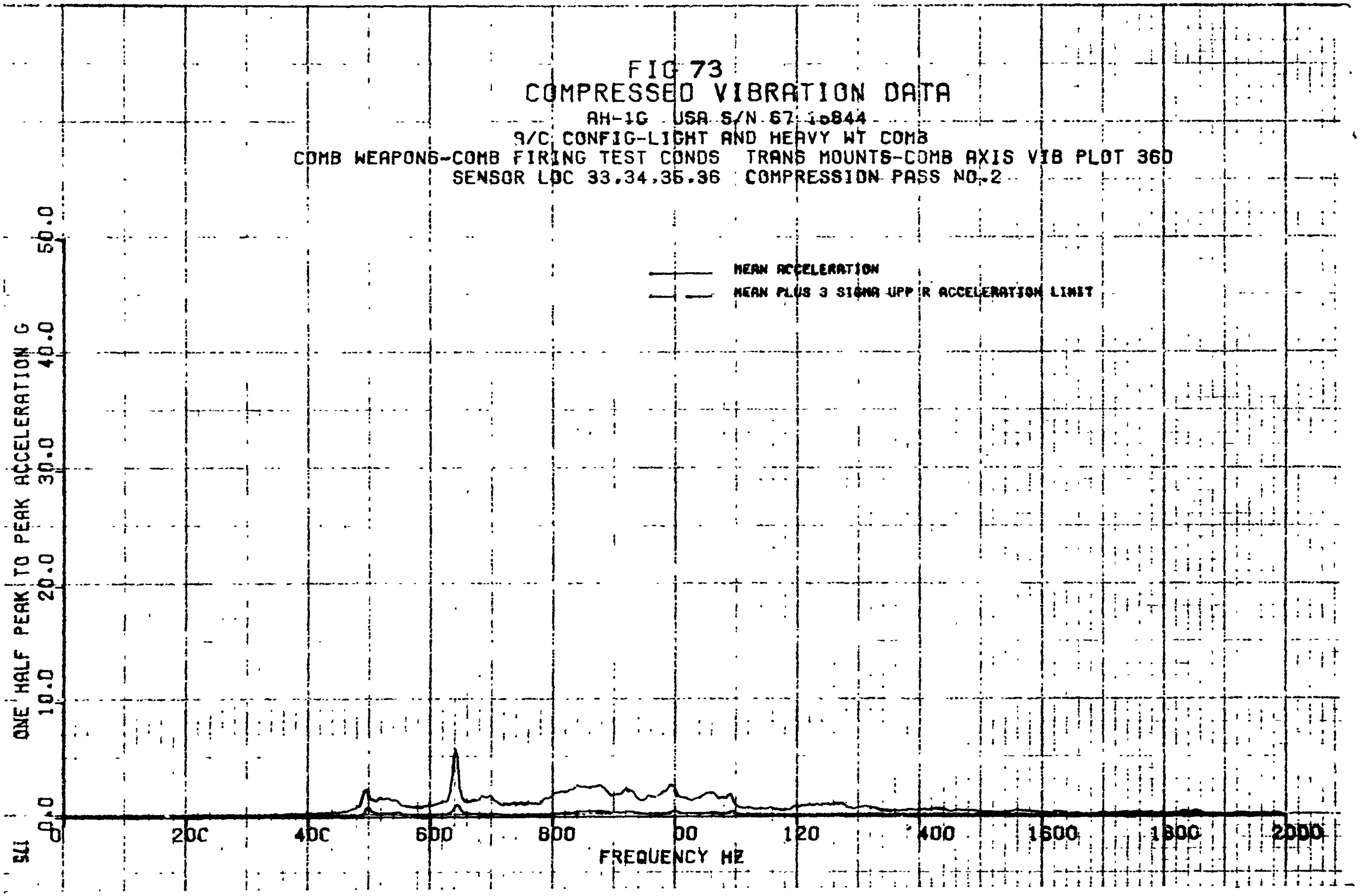
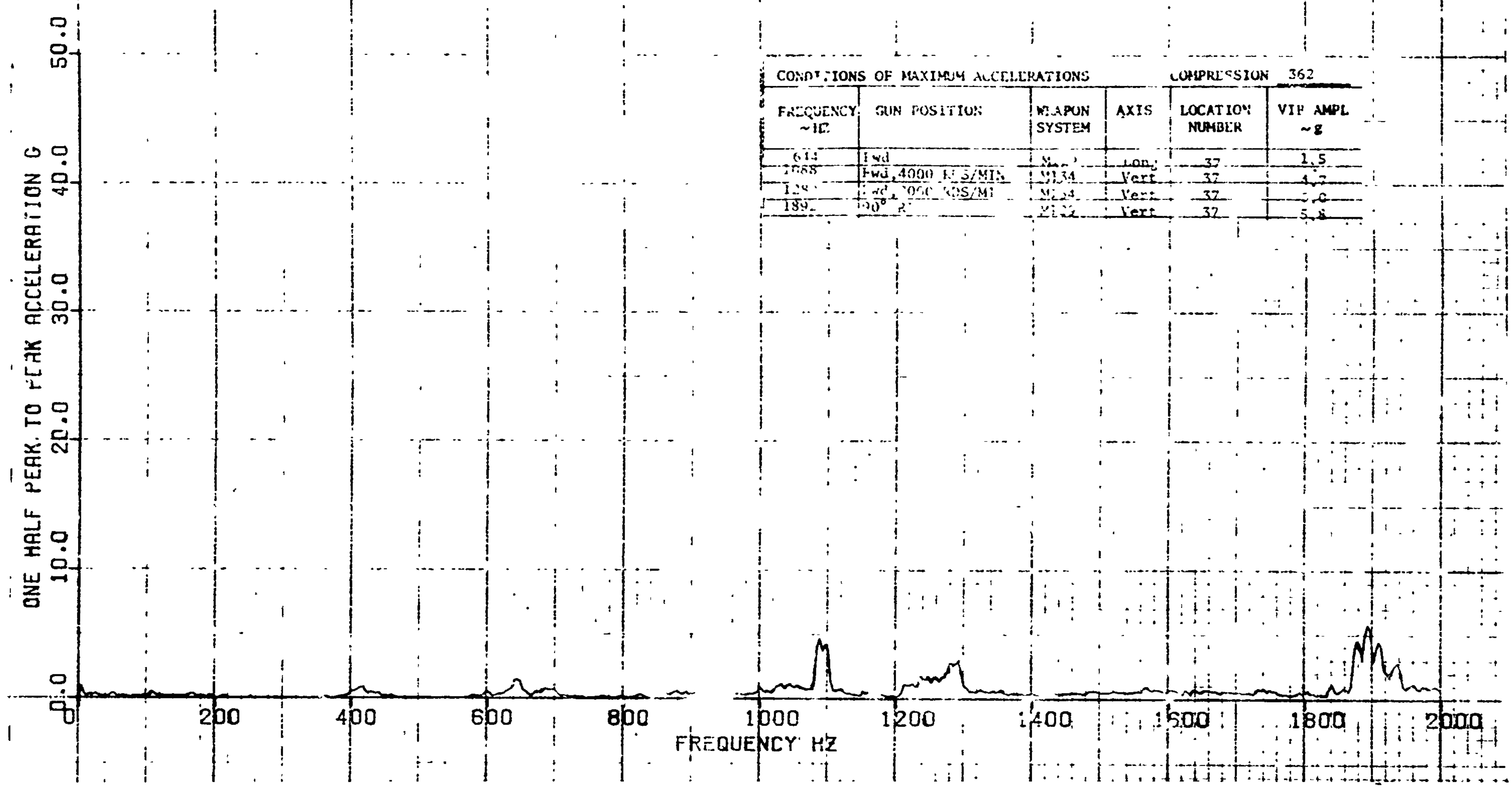


FIG 73
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS TRANS MOUNTS-COMB AXIS VIB PLOT 360
SENSOR LOC 33,34,35,36 COMPRESSION PASS NO. 2

FIG 74
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 57-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS TRANS CASE-COMB AXIS VIB PLOT 362
SENSOR LOC 37 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS COMPRESSION 362

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
614	Fwd	[illegible]	Long	37	1.5
1088	Fwd,4000 RDS/MIN	M134	Vert	37	4.7
128[illegible]	Fwd,2000 RDS/MI	M134	Vert	37	[illegible]
189[illegible]	90° R[illegible]	[illegible]	Vert	37	5.8

FIG 75

COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS TRANS CASE-COMB AXIS VIB PLOT 362
SENSOR LOC 37 COMPRESSION PASS NO.2

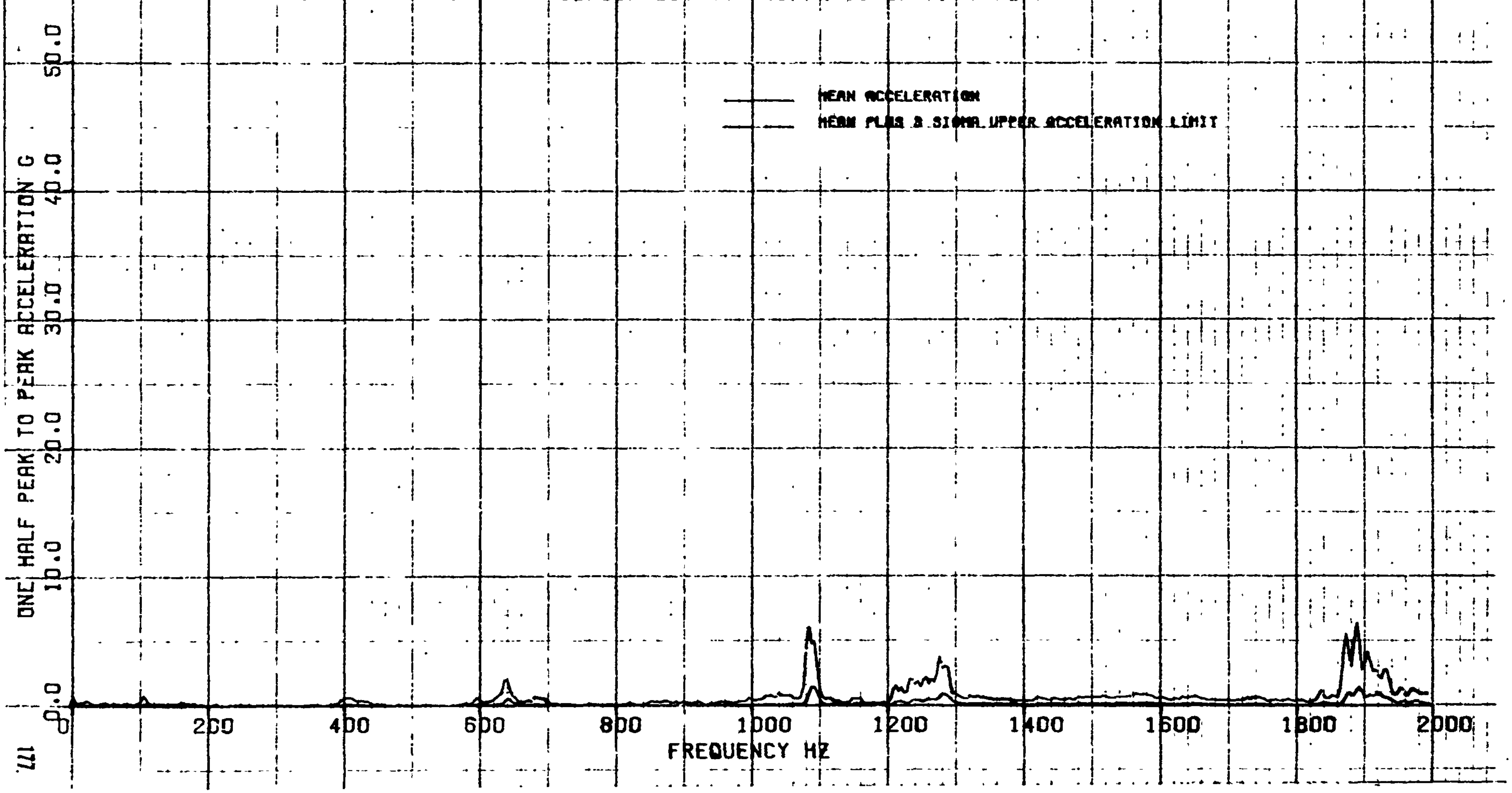
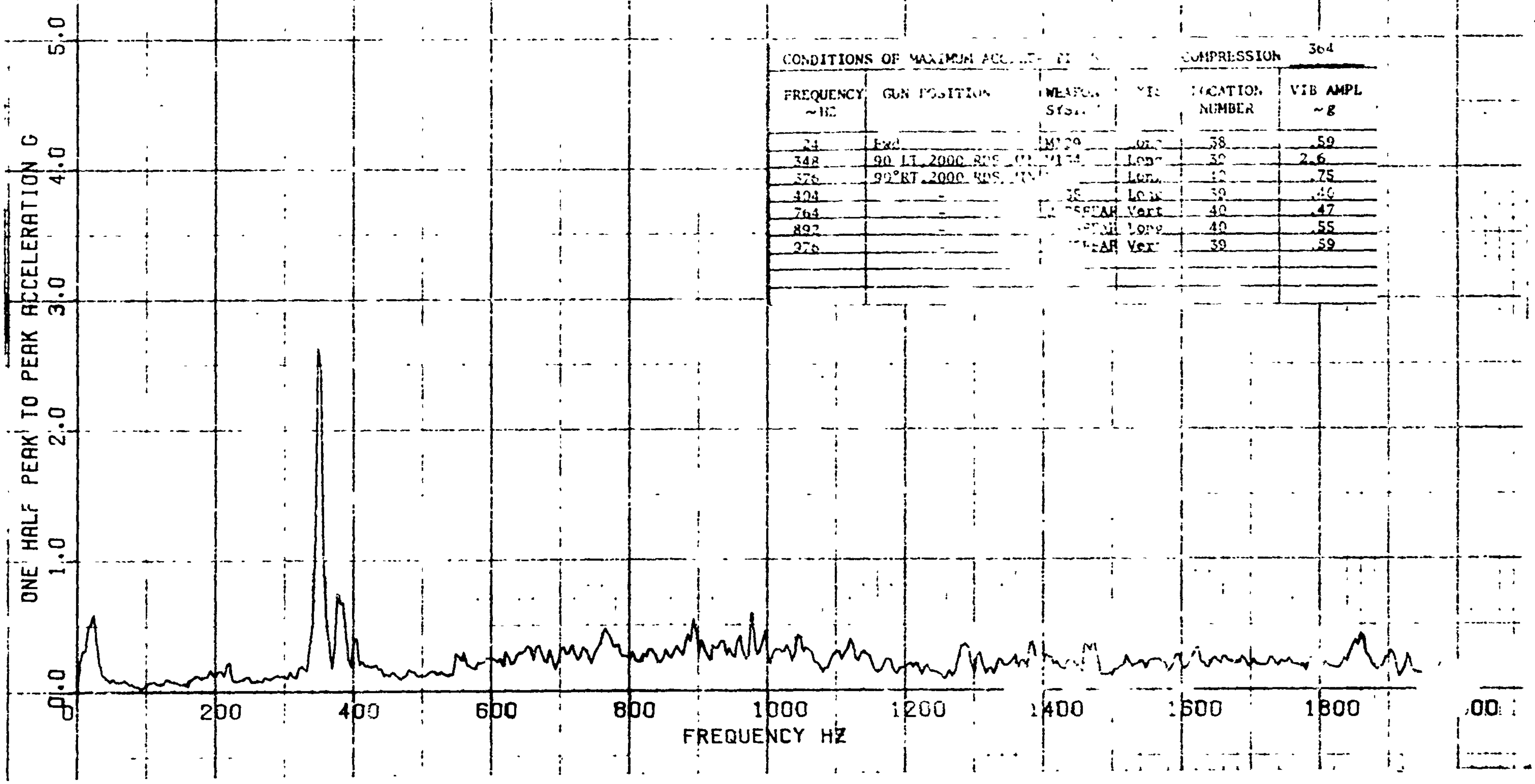


FIG 76
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS, ENG MOUNTS-COMB AXIS VIB PLOT 364
SENSOR LOC 38,39,40 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACC[illegible] COMPRESSION 364

FREQUENCY ~HZ	GUN POSITION	WEAPON SYST.	[illegible]	LOCATION NUMBER	VIB AMPL ~g
24	Fwd	M129	[illegible]	38	.59
348	90 LT 2000 RPS [illegible]	M134	Long	39	2.6
376	90°RT 2000 RPS [illegible]		Long	[illegible]	.75
404	-	[illegible]	Long	39	.40
764	-	[illegible]SPEAR	Vert	40	.47
892	-	[illegible]	Long	40	.55
276	-	[illegible]SPEAR	Vert	39	.59

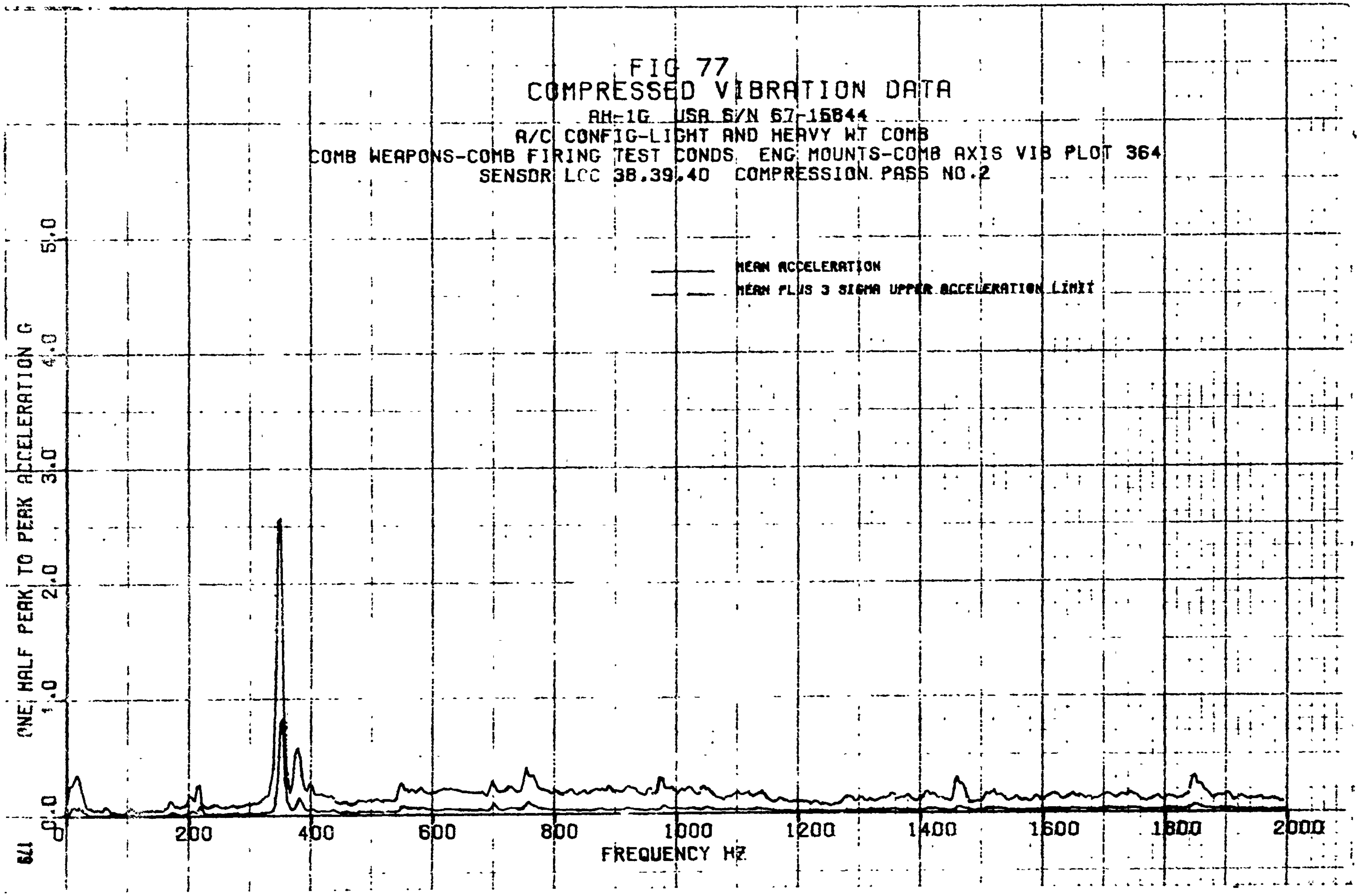
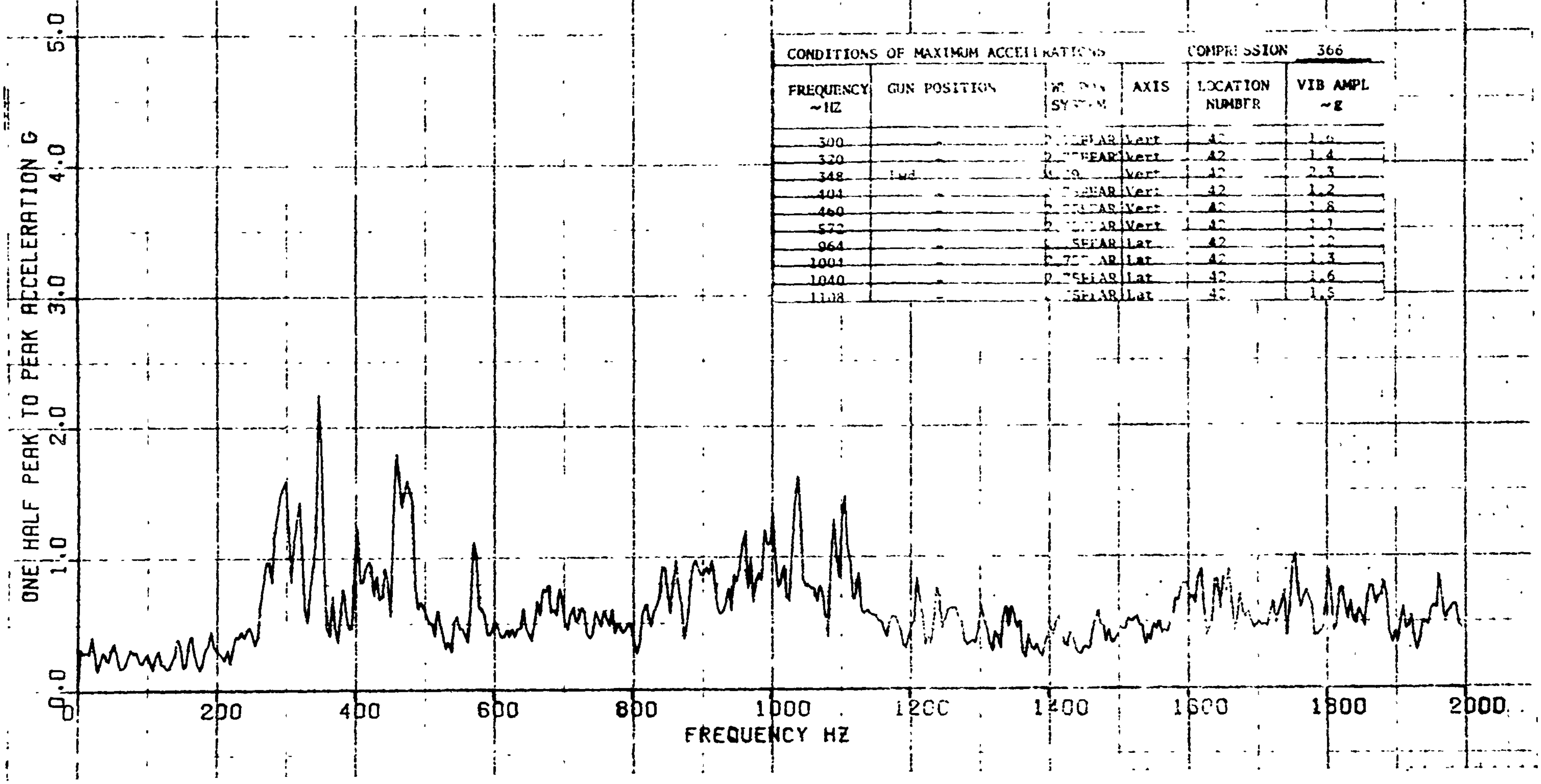


FIG 77
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS ENG MOUNTS-COMB AXIS VIB PLOT 364
SENSOR LOC 38,39,40 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

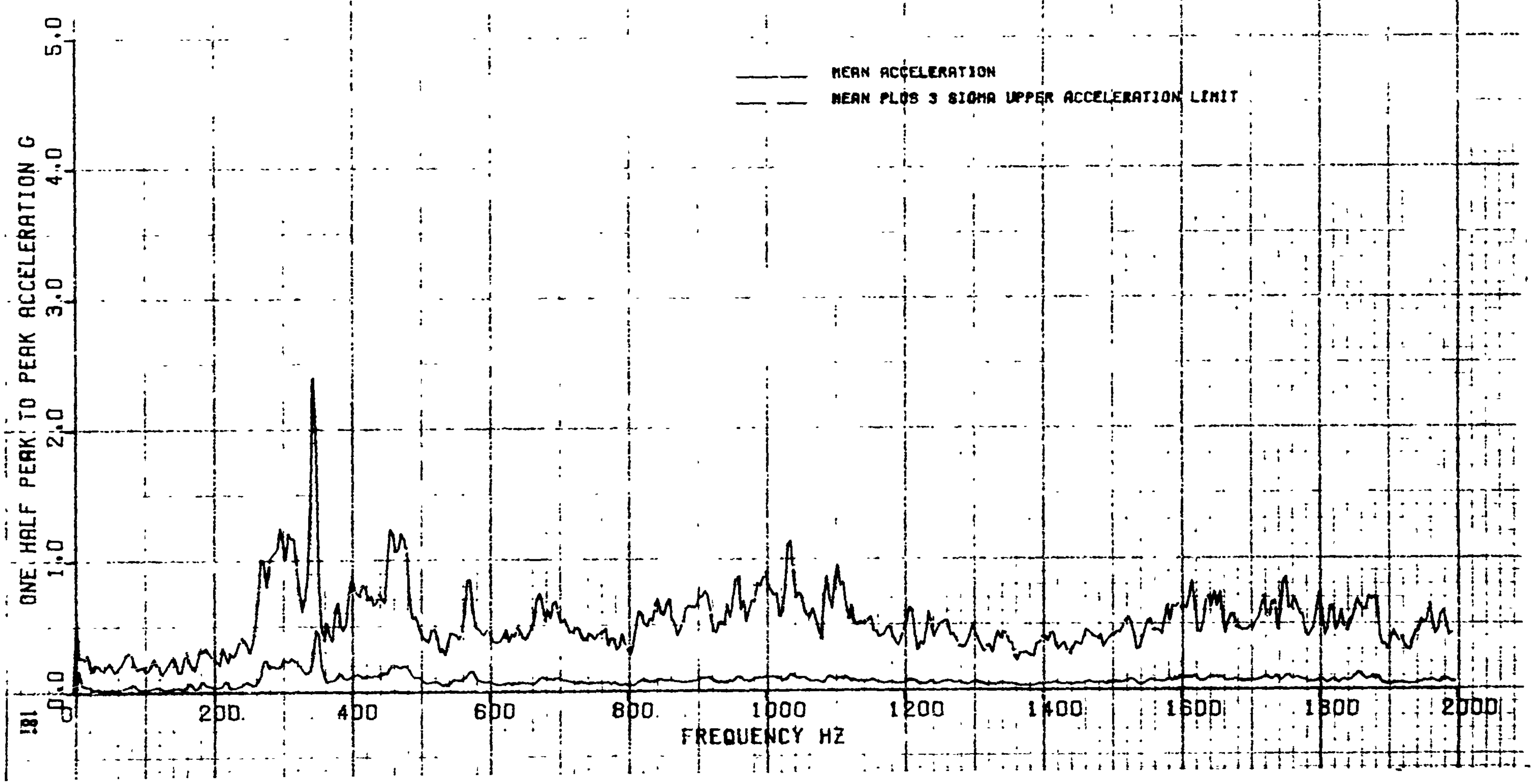
FIG 78
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
A?-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRIN? TEST CONDS ENG DECK-COMB AXIS VIB PLOT 366
SENSOR LOC 41,42 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS COMPRESSION 366

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
300	-	[illegible]SEPAR	Vert	42	1.6
320	-	2 [illegible]SEPAR	Vert	42	1.4
348	Fwd	[illegible]	Vert	42	2.3
404	-	[illegible]SEPAR	Vert	42	1.2
460	-	[illegible]SEPAR	Vert	42	1.8
572	-	[illegible]SEPAR	Vert	42	1.1
964	-	[illegible] SEPAR	Lat	42	[illegible]
1001	-	[illegible]SEPAR	Lat	42	1.3
1040	-	[illegible]SEPAR	Lat	42	1.6
1108	-	[illegible]SEPAR	Lat	42	1.5

FIG 79
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS ENG DECK-COMB AXIS VIB PLOT 366
SENSOR LOC 41.42 COMPRESSION PASS NO.2



182

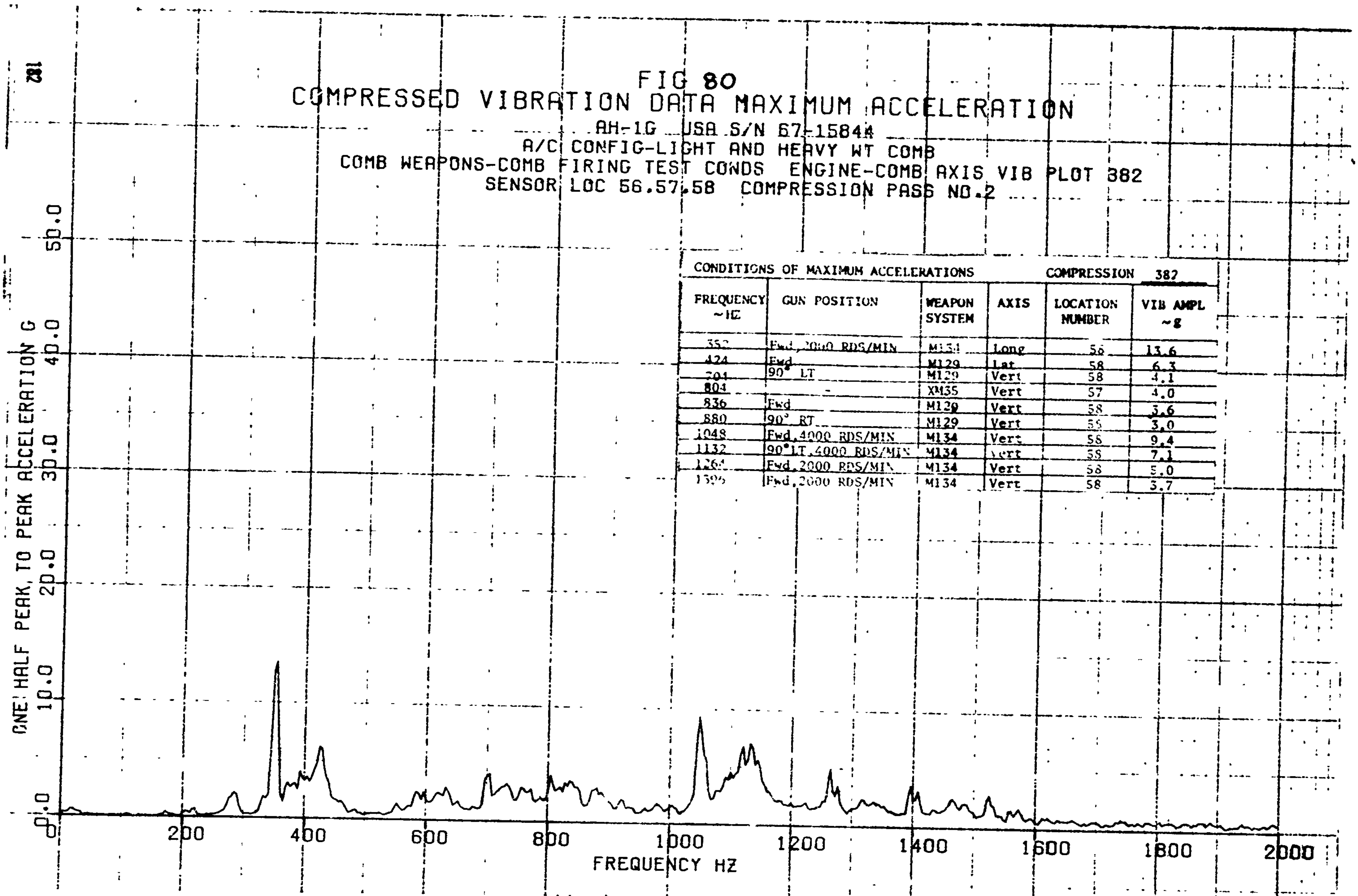


FIG 80
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS ENGINE-COMB AXIS VIB PLOT 382
SENSOR LOC 56.57.58 COMPRESSION PASS NO.2

CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 382

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
352	Fwd,2000 RDS/MIN	M134	Long	56	13.6
424	Fwd	M129	Lat	58	6.3
704	90° LT	M129	Vert	58	4.1
804	-	XM35	Vert	57	4.0
836	Fwd	M129	Vert	58	3.6
880	90° RT	M129	Vert	55	3.0
1048	Fwd,4000 RDS/MIN	M134	Vert	56	9.4
1132	90°LT,4000 RDS/MIN	M134	Vert	55	7.1
1264	Fwd,2000 RDS/MIN	M134	Vert	56	5.0
1396	Fwd,2000 RDS/MIN	M134	Vert	58	3.7

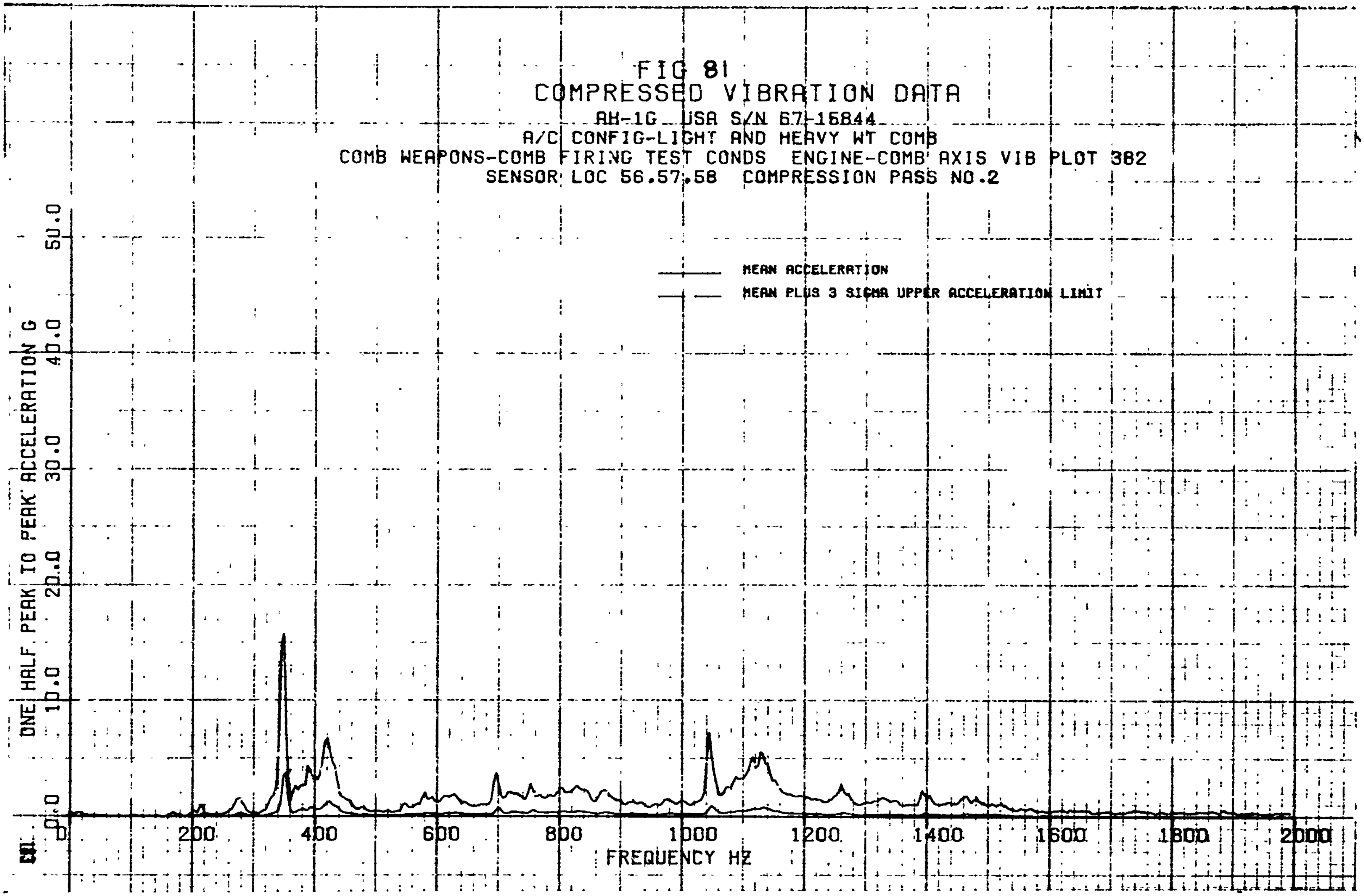
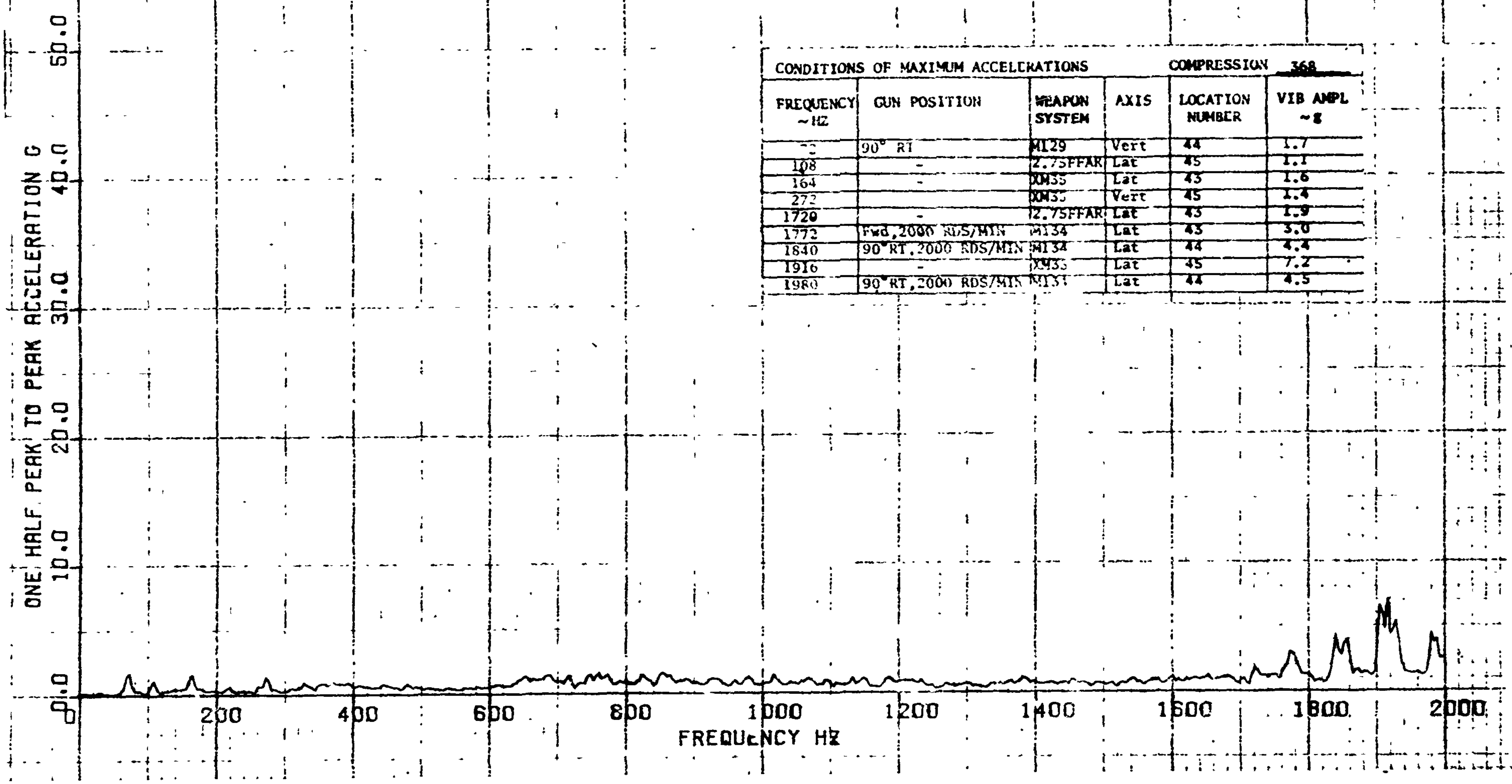


FIG 81
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS ENGINE-COMB AXIS VIB PLOT 382
SENSOR LOC 56.57.58 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
10.0
20.0
30.0
40.0
50.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 82
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS HANGAR BRGS-COMB AXIS VIB PLOT 368
SENSOR LOC 43.44.45 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 368

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
[illegible]	90° RT	M129	Vert	44	1.7
108	-	2.75FFAR	Lat	45	1.1
164	-	XM35	Lat	43	1.6
272		XM35	Vert	45	1.4
1720	-	2.75FFAR	Lat	43	1.9
1772	Fwd,2000 RDS/MIN	M134	Lat	43	3.0
1840	90°RT,2000 RDS/MIN	M134	Lat	44	4.4
1916	-	XM35	Lat	45	7.2
1980	90°RT,2000 RDS/MIN	M134	Lat	44	4.5

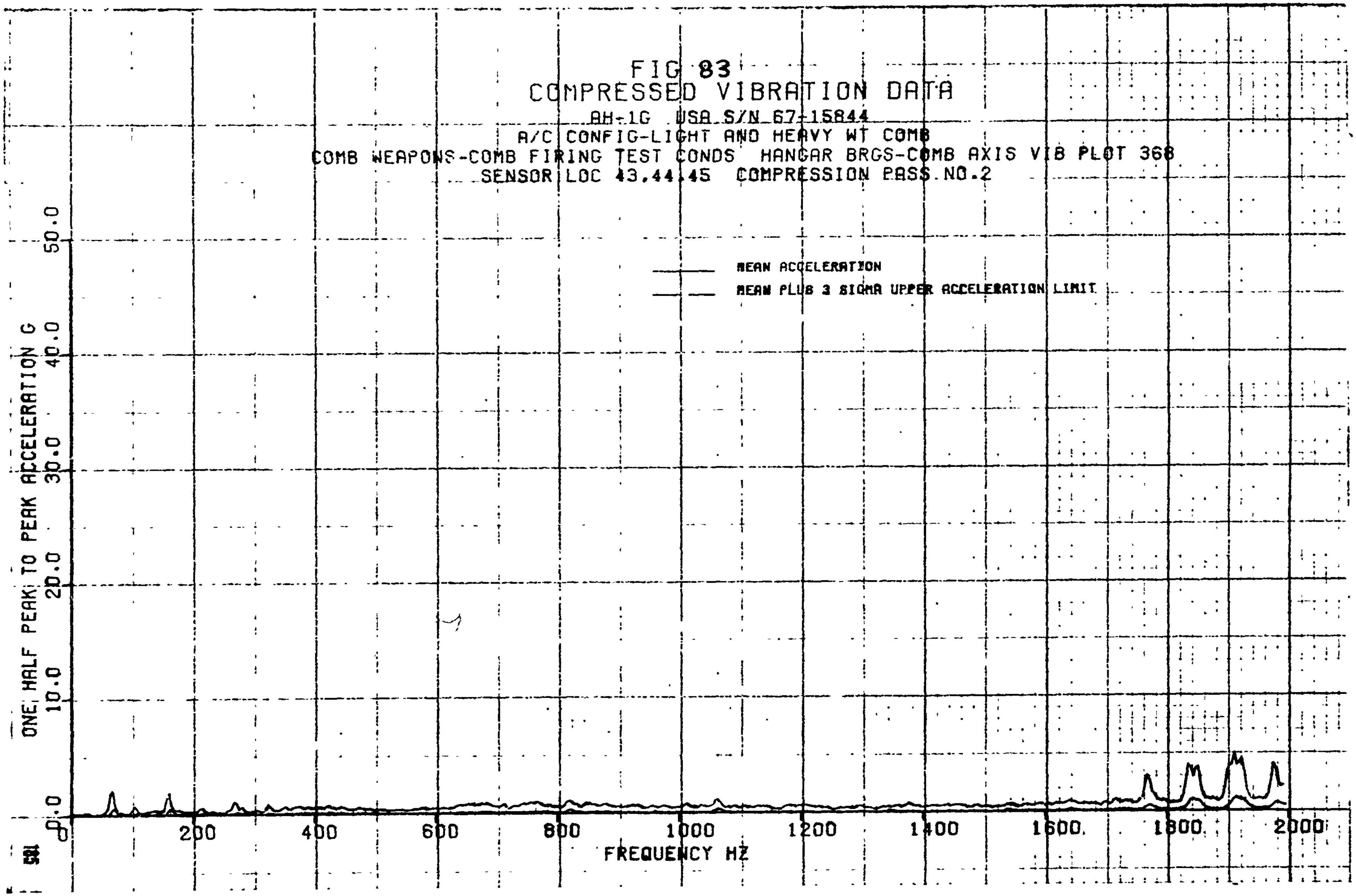


FIG 83
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS HANGAR BRGS-COMB AXIS VIB PLOT 368
SENSOR LOC 43,44,45 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
10.0
20.0
30.0
40.0
50.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 84

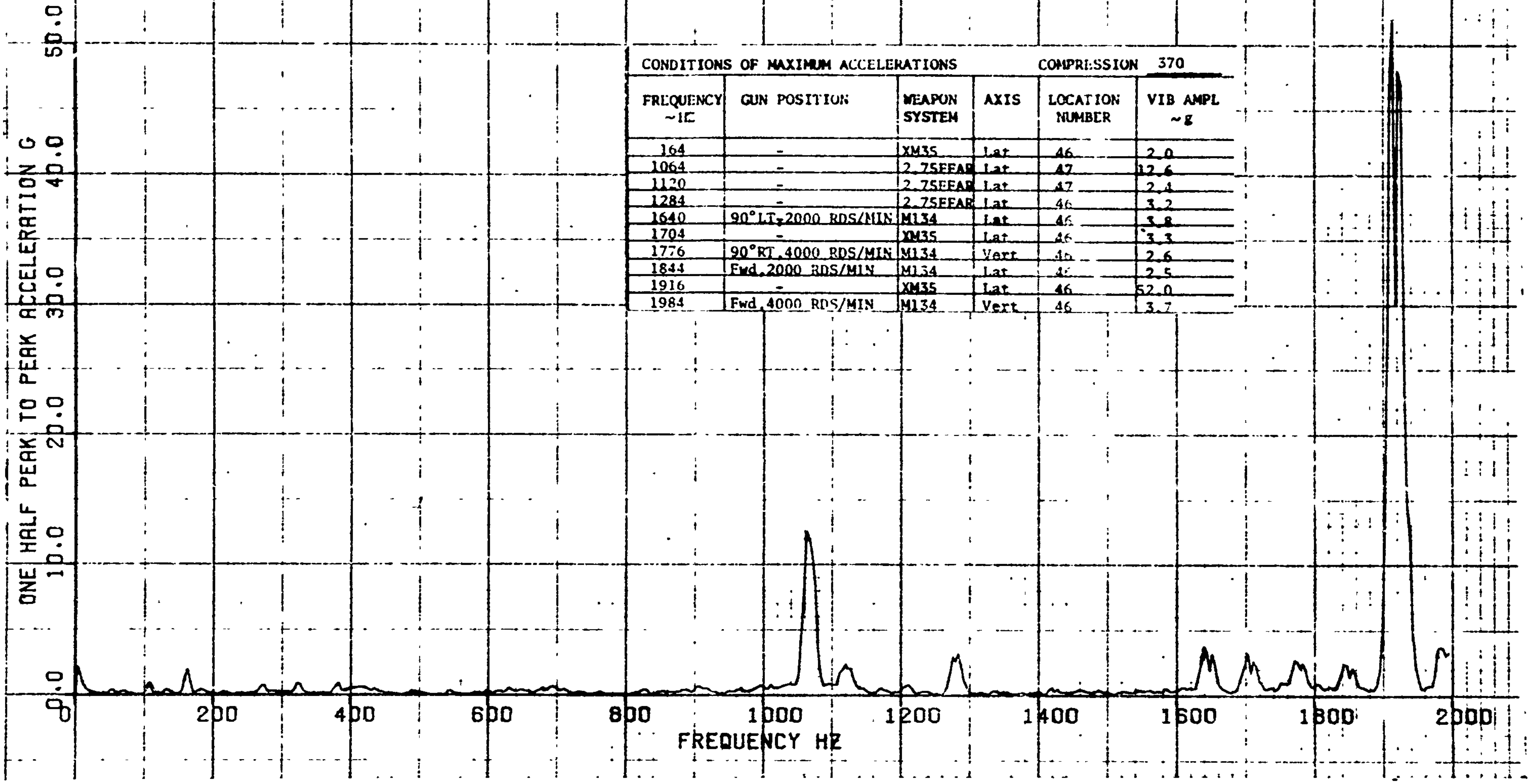
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB WEAPONS-COMB FIRING TEST CONDS 42 AND 90 DEG GB-COMB AXIS VIB PLOT 370

SENSOR LOC 46.47 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 370

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
164	-	XM35	Lat	46	2.0
1064	-	2.75FFAR	Lat	47	12.6
1120	-	2.75FFAR	Lat	47	2.4
1284	-	2.75FFAR	Lat	46	3.2
1640	90°LT,2000 RDS/MIN	M134	Lat	46	3.8
1704	-	XM35	Lat	46	3.3
1776	90°RT,4000 RDS/MIN	M134	Vert	46	2.6
1844	Fwd,2000 RDS/MIN	M134	Lat	46	2.5
1916	-	XM35	Lat	46	52.0
1984	Fwd,4000 RDS/MIN	M134	Vert	46	3.7

FIG 85
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS 42 AND 90 DEG GB-COMB AXIS VIB PLOT 370
SENSOR LOC 46.47 COMPRESSION PASS NO.2

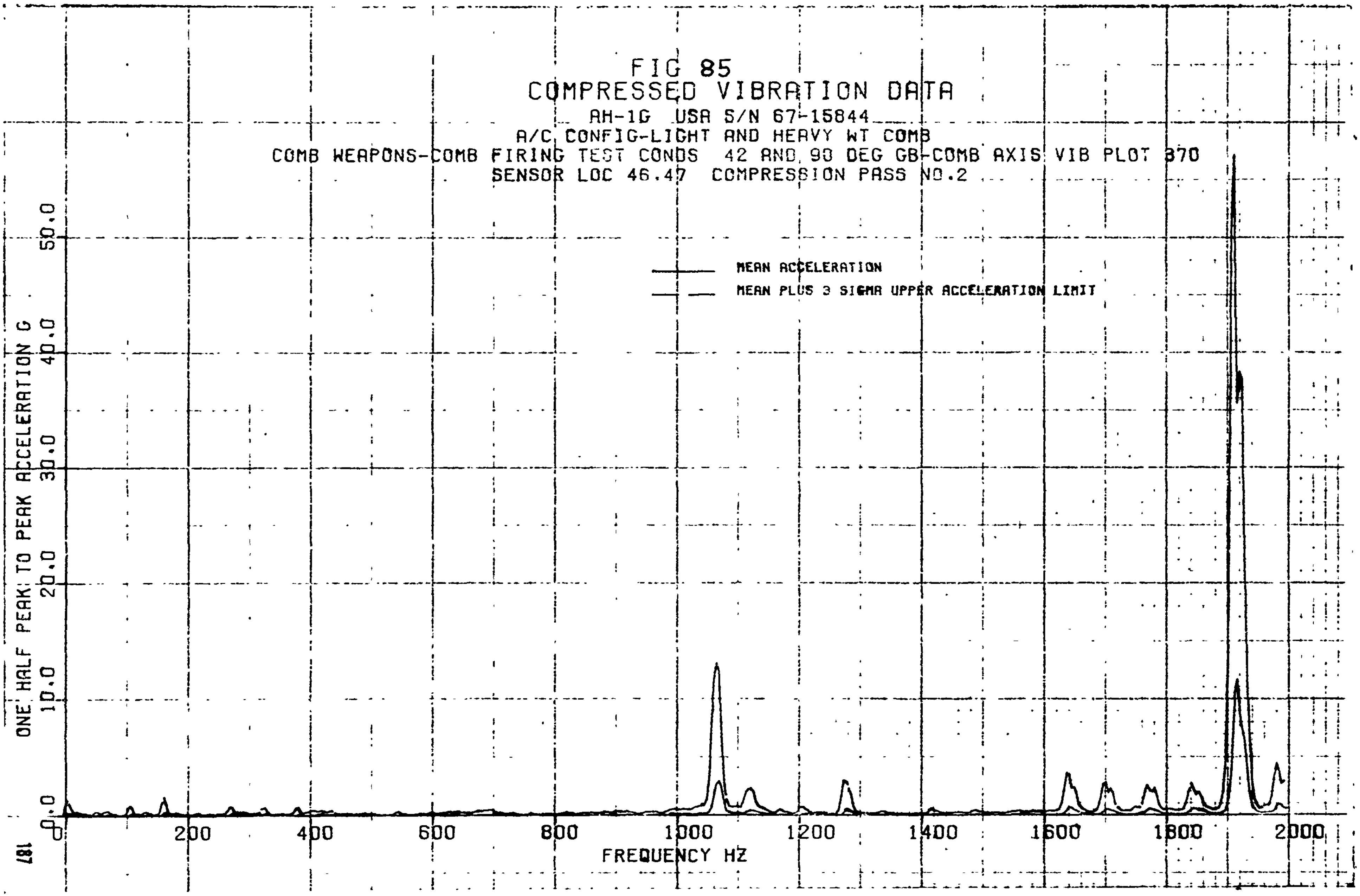


FIG 86

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB WEAPONS-COMB FIRING TEST CONDS TAIL BOOM ATTACH PTS-COMB AXIS VIB PLOT 372

SENSOR LOC 48.49 COMPRESSION PASS NO.2

CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 372

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
108	Fwd 4000 RDS/MIN	M134	Vert	48	.14
164	90°RT 2000 RDS/MIN	M134	Vert	48	.14
216	Fwd 4000 RDS/MIN	M134	Vert	48	.12
348	90°LT 2000 RDS/MIN	M134	Vert	48	.13
896	90°LT 2000 RDS/MIN	M134	Vert	48	.11
1840	90°RT 2000 RDS/MIN	M134	Vert	48	.28
1912	90°LT 4000 RDS/MIN	M134	Long	12	.54

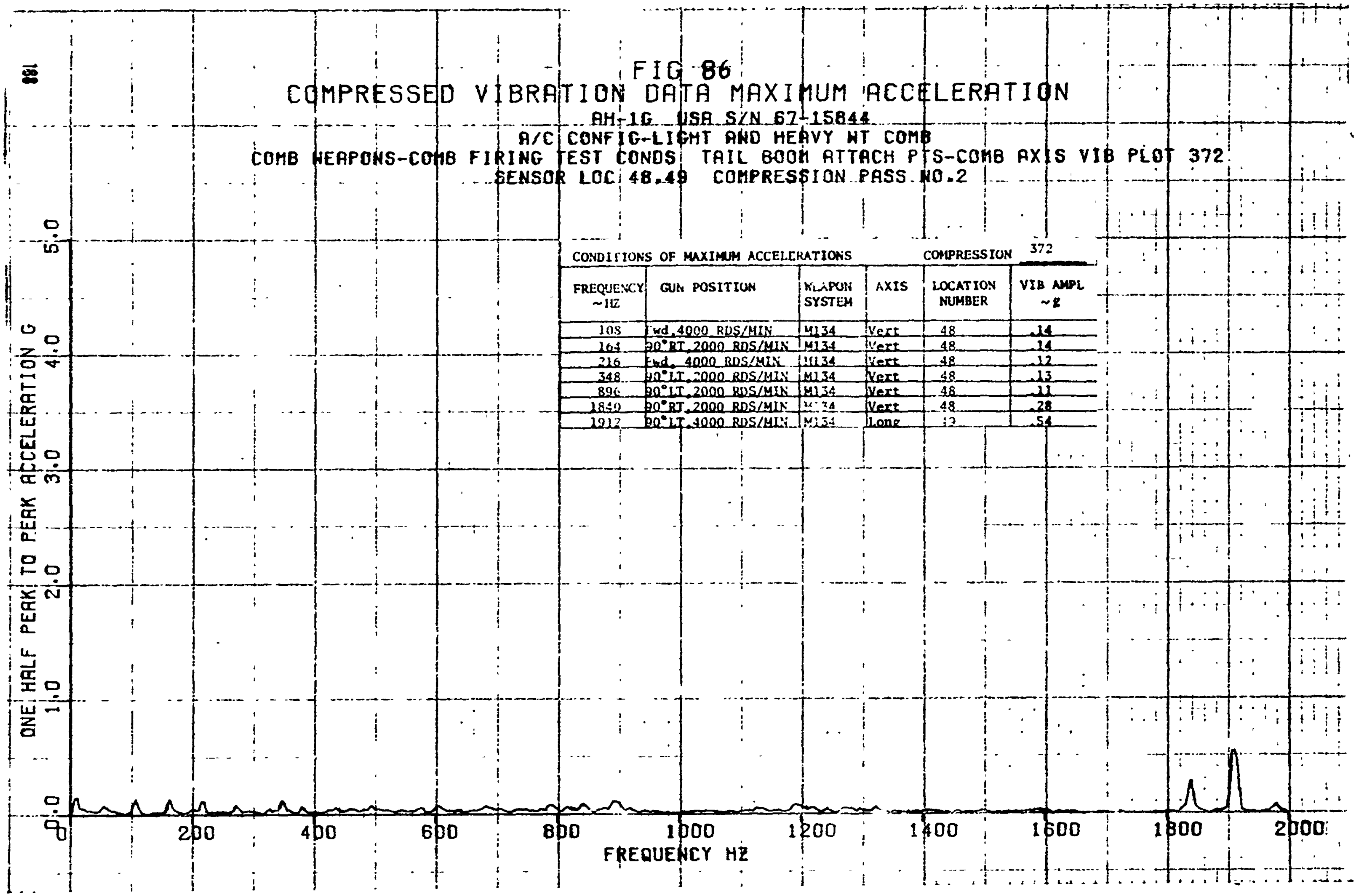


FIG 87

COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB WEAPONS-COMB FIRING TEST CONDS TAIL BOOM ATTACH PTS-COMB AXIS VIB PLOT 372

SENSOR LOC 48.49 COMPRESSION PASS NO.2

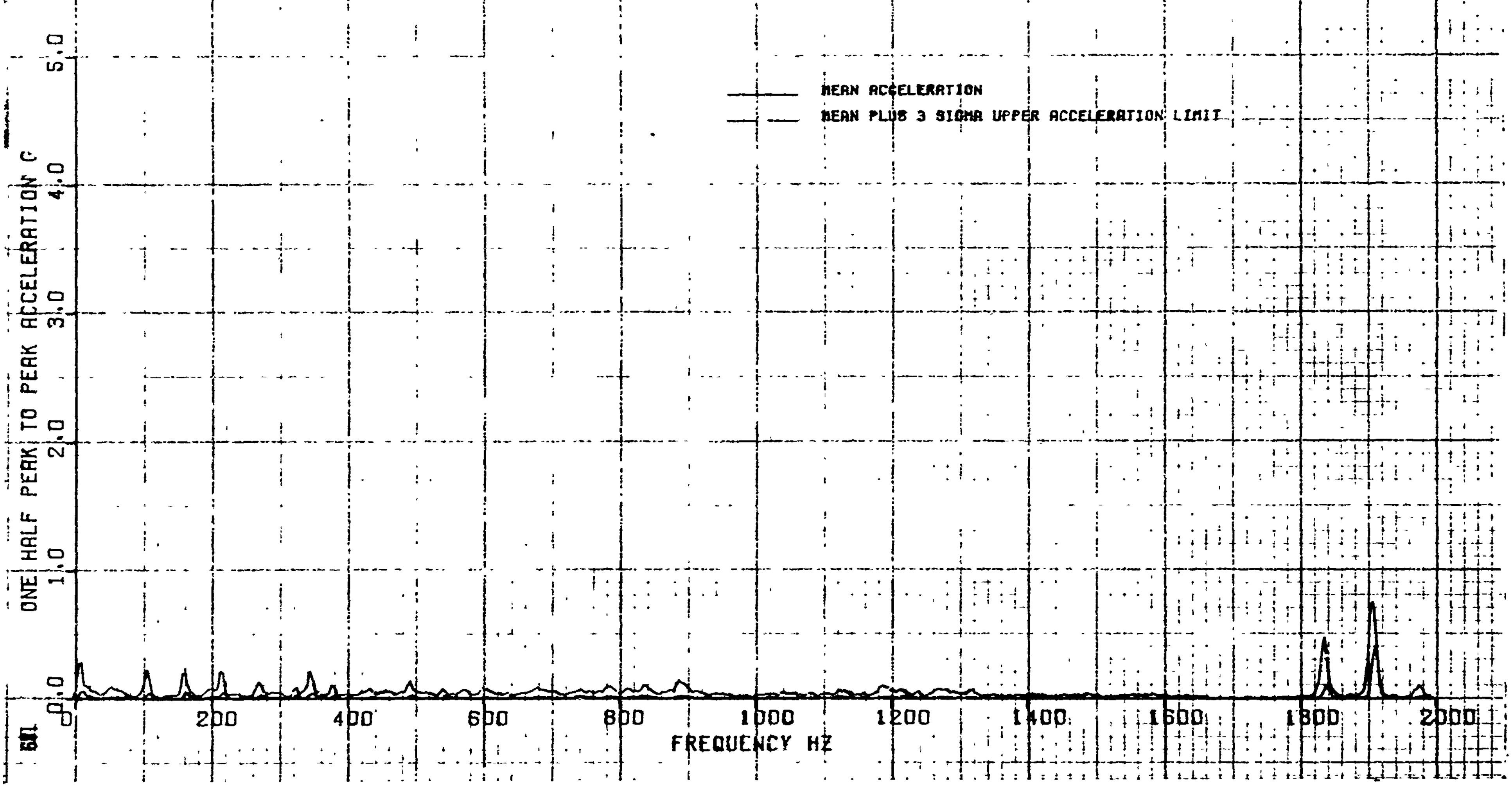
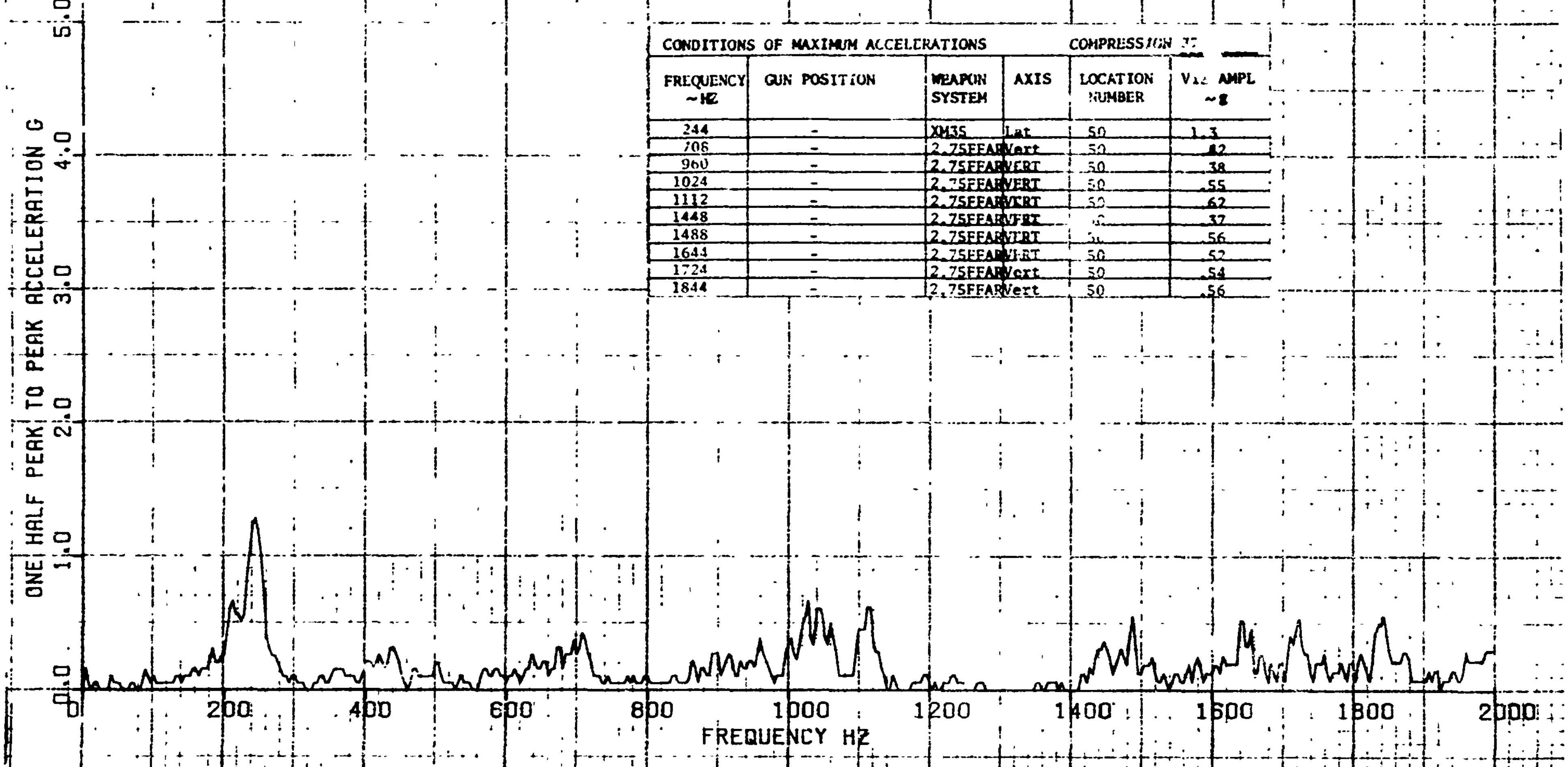


FIG 88
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS CLTV SERVO-COMB AXIS VIB PLOT 374
SENSOR LOC 50 COMPRESSION PASS NO.2

CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 37

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	V1/2 AMPL ~g
244	-	XM35	Lat	50	1.3
708	-	2.75FFAR	Vert	50	.82
960	-	2.75FFAR	VERT	50	.38
1024	-	2.75FFAR	VERT	50	.55
1112	-	2.75FFAR	VERT	50	.62
1448	-	2.75FFAR	VERT	50	.37
1488	-	2.75FFAR	VERT	50	.56
1644	-	2.75FFAR	VERT	50	.52
1724	-	2.75FFAR	Vert	50	.54
1844	-	2.75FFAR	Vert	50	.56



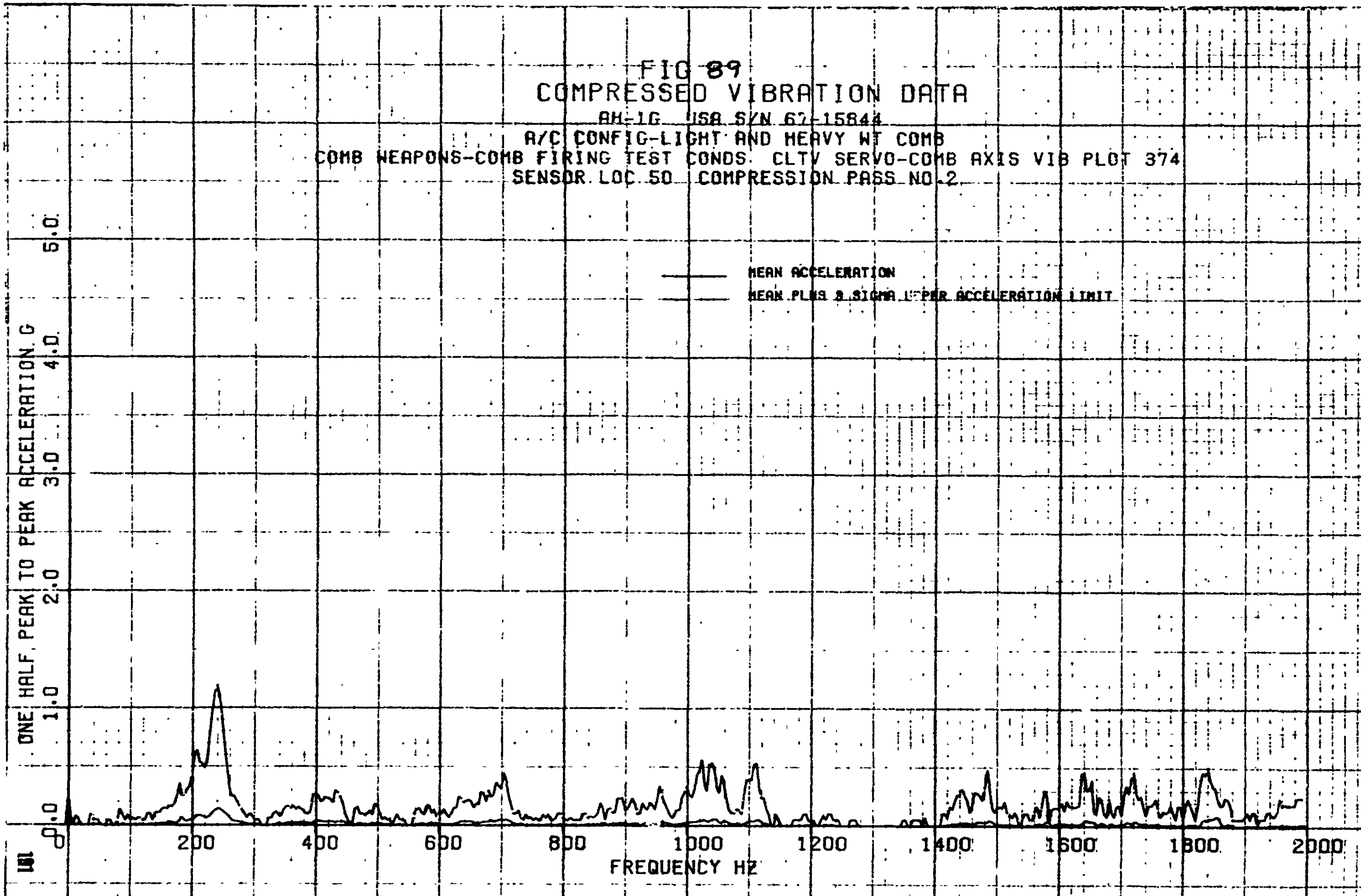


FIG 89
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS. CLTV SERVO-COMB AXIS VIB PLOT 374
SENSOR LOC 50 COMPRESSION PASS NO 2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION, G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 90

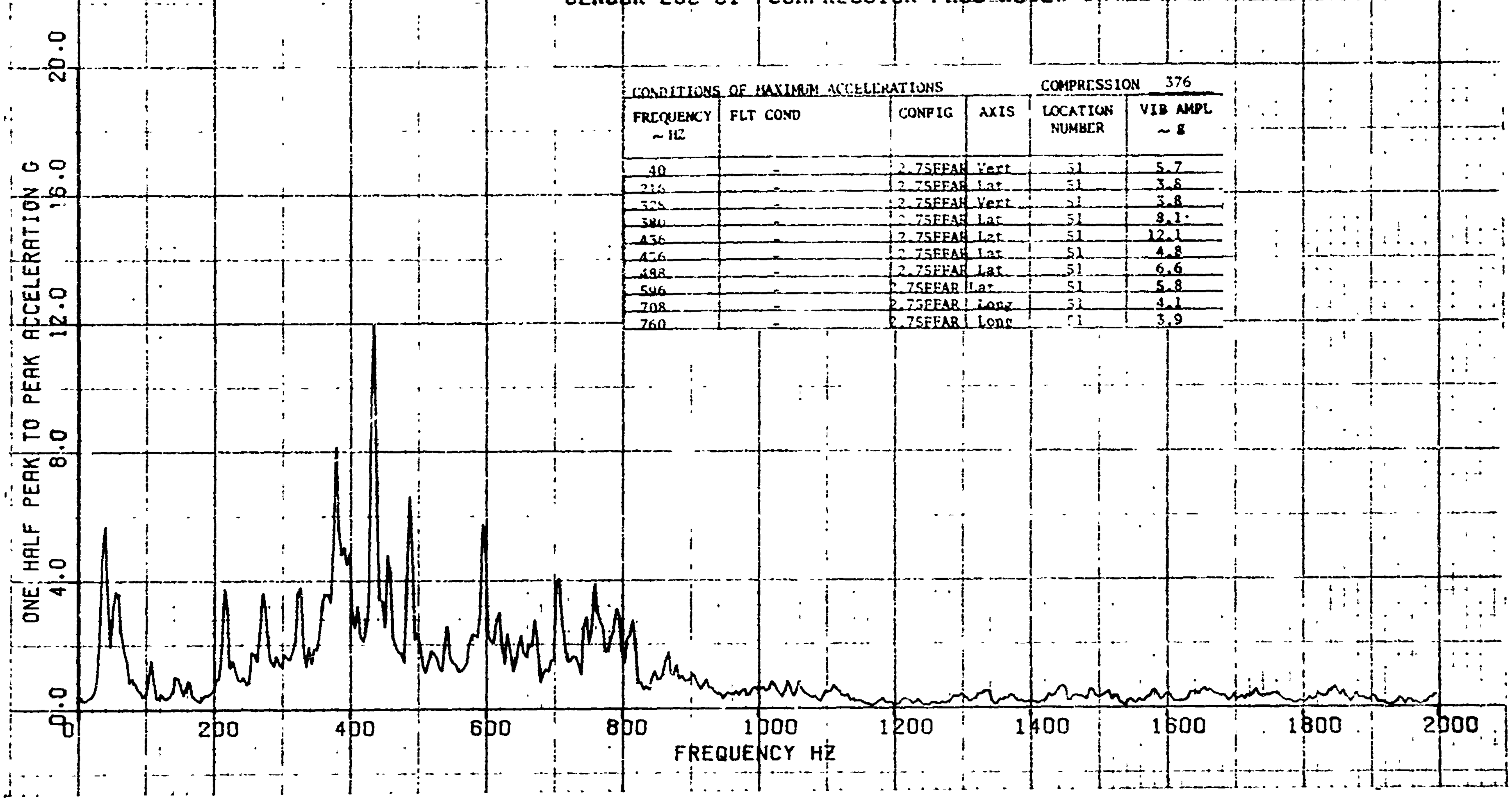
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

COMB WEAPONS-COMB FIRING TEST CONDS ELEV TIP-COMB AXIS VIB PLOT 376

SENSOR LOC 51 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 376

FREQUENCY ~ HZ	FLT COND	CONFIG	AXIS	LOCATION NUMBER	VIB AMPL ~ g
40	-	2.75FFAR	Vert	51	5.7
216	-	2.75FFAR	Lat	51	3.6
328	-	2.75FFAR	Vert	51	3.8
380	-	2.75FFAR	Lat	51	8.1
436	-	2.75FFAR	Lat	51	12.1
456	-	2.75FFAR	Lat	51	4.8
488	-	2.75FFAR	Lat	51	6.6
596	-	2.75FFAR	Lat	51	5.8
708	-	2.75FFAR	Long	51	4.1
760	-	2.75FFAR	Long	51	3.9

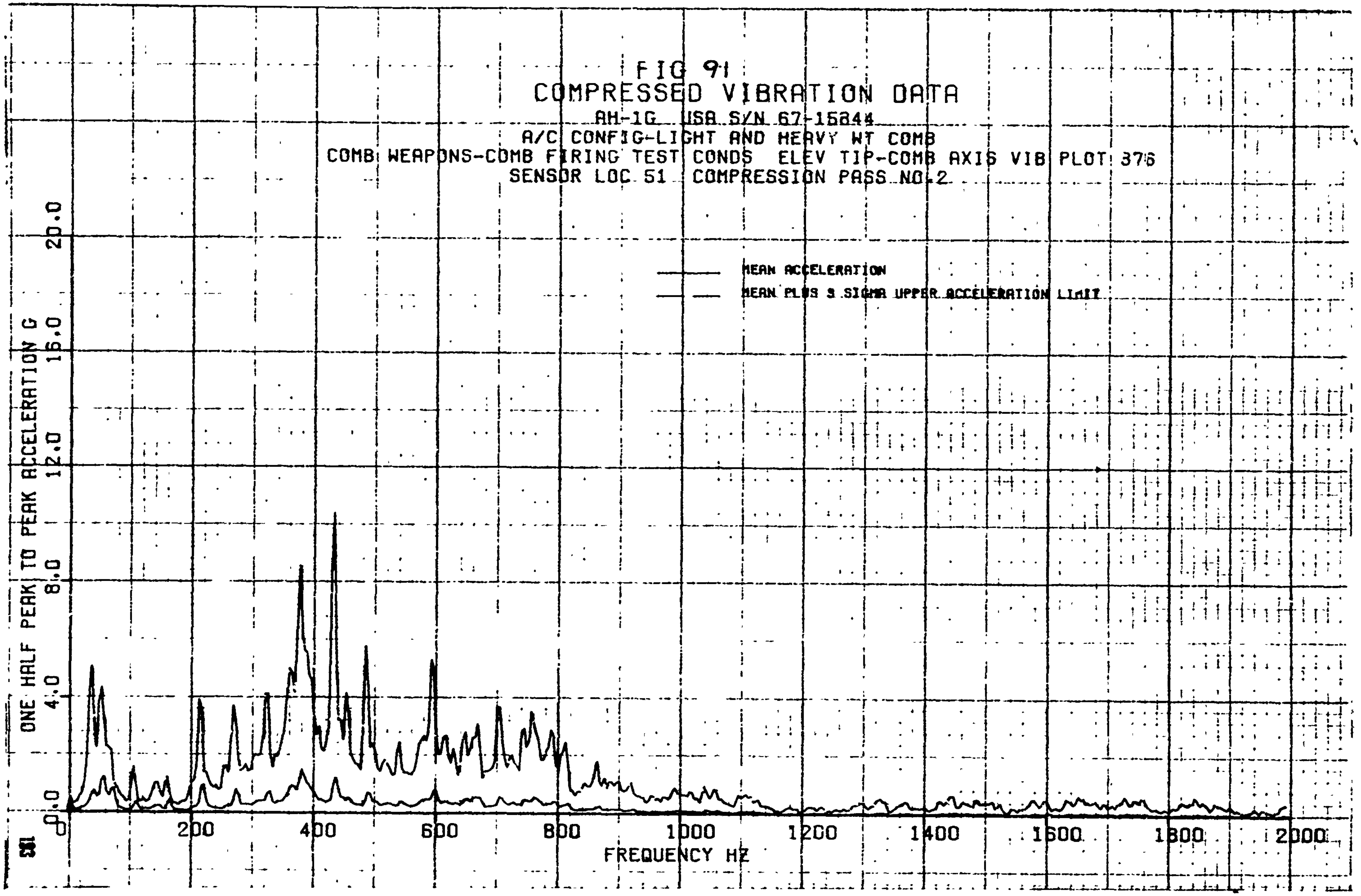
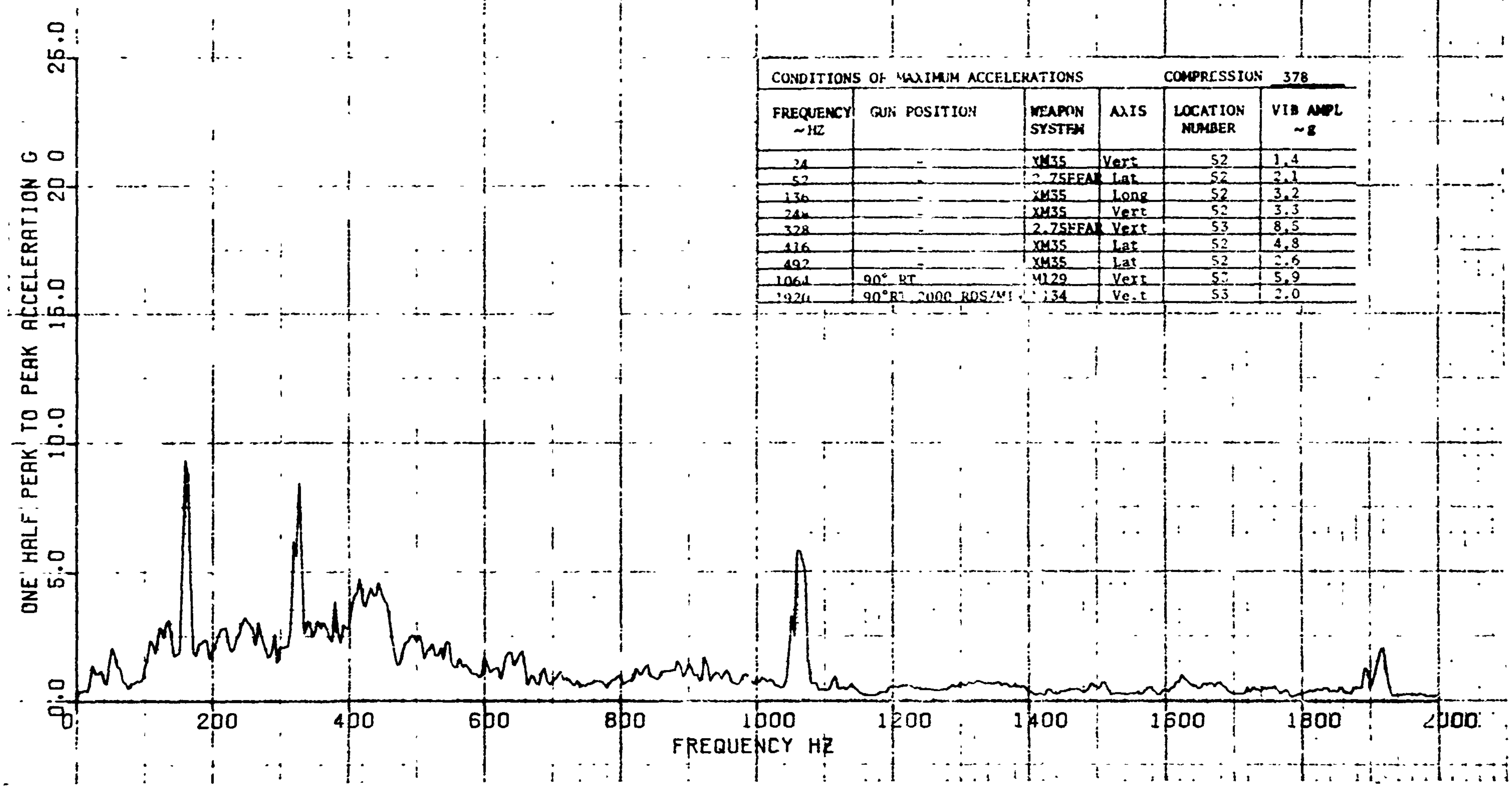


FIG 91
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS ELEV TIP-COMB AXIS VIB PLOT 376
SENSOR LOC 51 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
4.0
8.0
12.0
16.0
20.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 92
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS NAV LIGHTS-COMB AXIS VIB PLOT 378
SENSOR LOC 52.53 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 378

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
24	-	XM35	Vert	52	1.4
52	-	2.75FFAR	Lat	52	2.1
136	-	XM35	Long	52	3.2
244	-	XM35	Vert	52	3.3
328	-	2.75FFAR	Vert	53	8.5
416	-	XM35	Lat	52	4.8
492	-	XM35	Lat	52	2.6
1064	90° RT	M129	Vert	52	5.9
1920	90°RT 2000 RDS/MI	134	Vert	53	2.0

FIG 93
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS NAV LIGHTS-COMB AXIS VIB PLOT 378
SENSOR LOC 52.53 COMPRESSION PASS NO.2

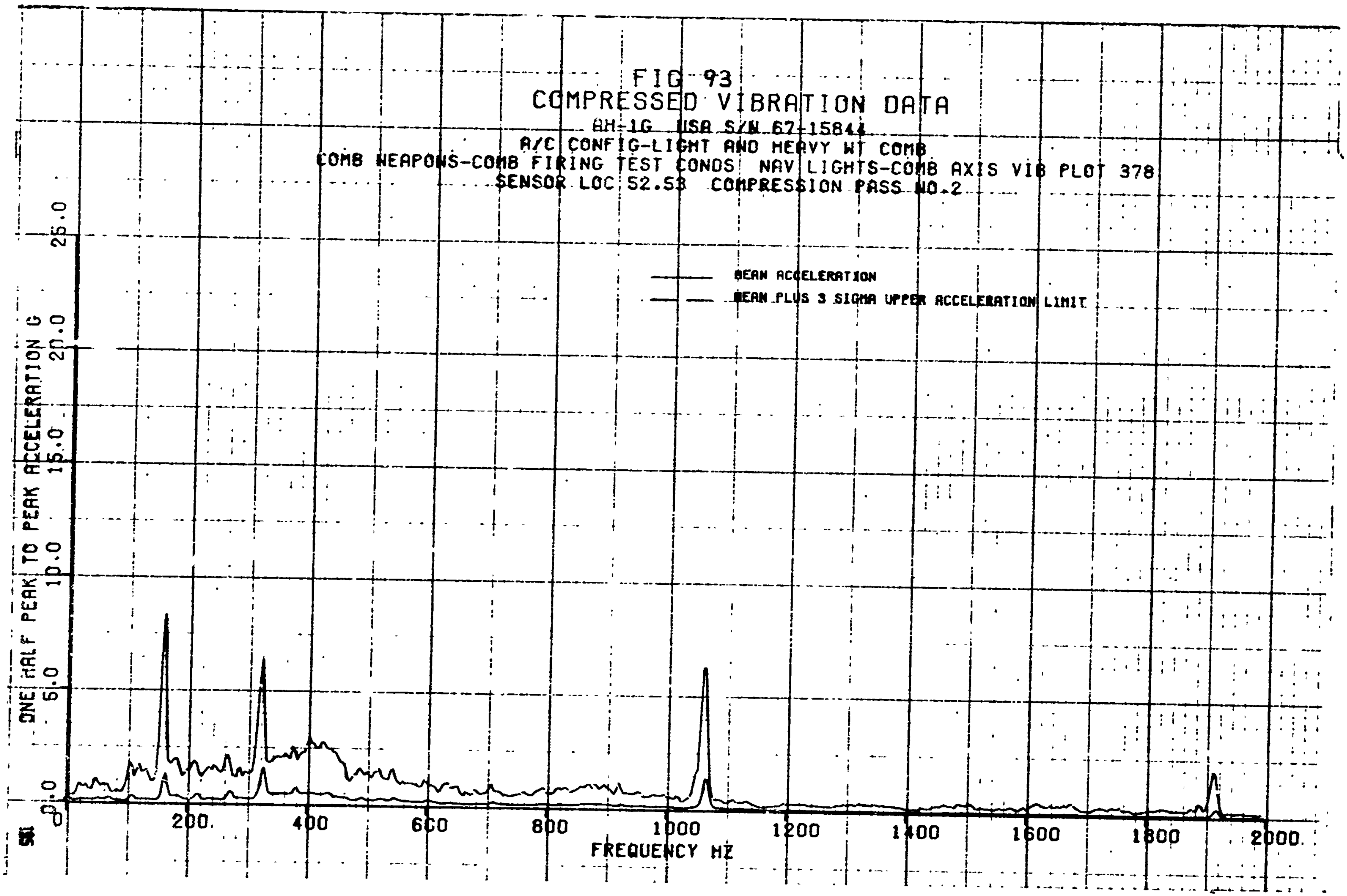
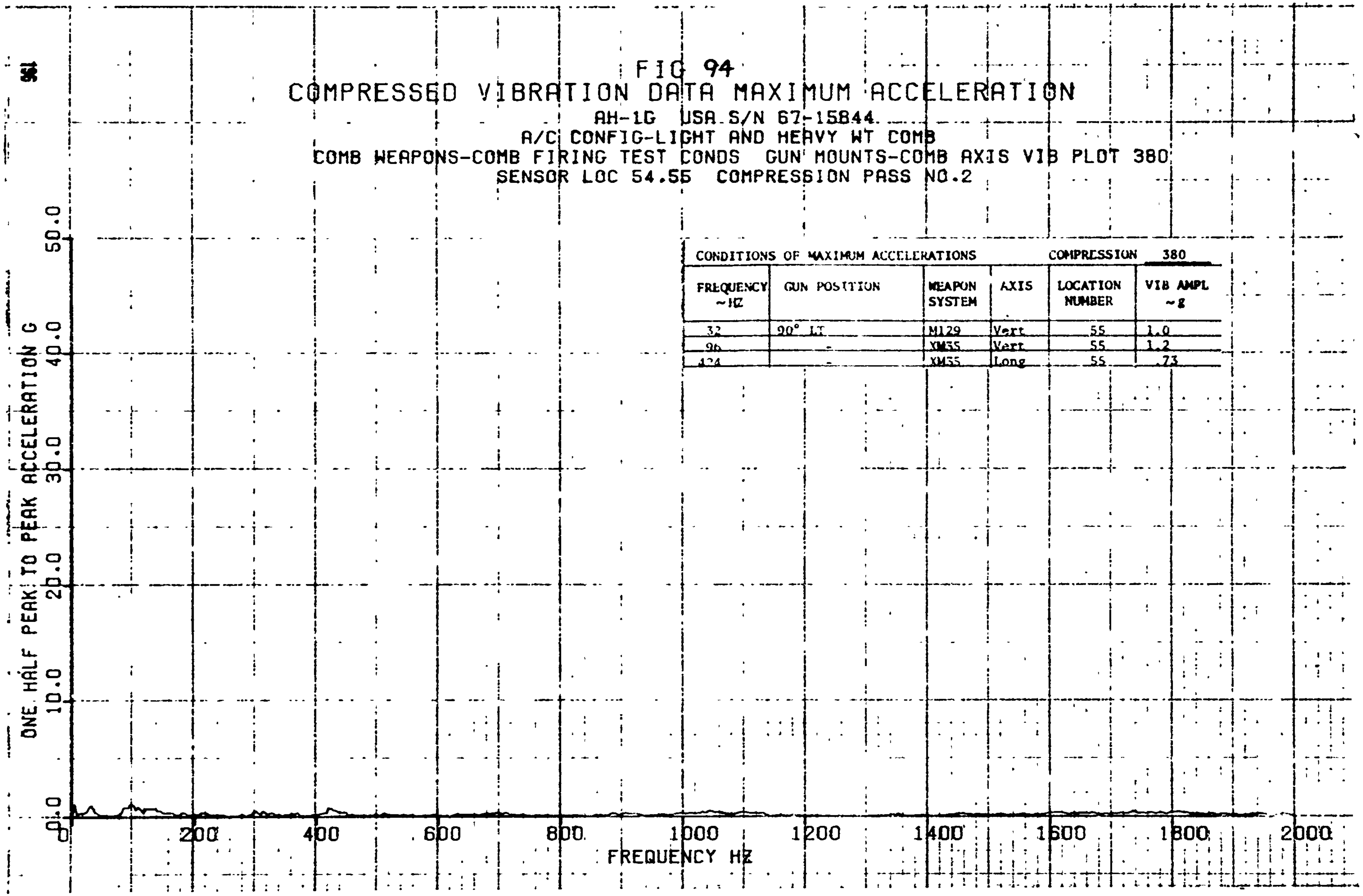


FIG 94
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS GUN MOUNTS-COMB AXIS VIB PLOT 380
SENSOR LOC 54.55 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 380

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
32	90° LT	M129	Vert	55	1.0
96	-	XM35	Vert	55	1.2
424	-	XM35	Long	55	.73

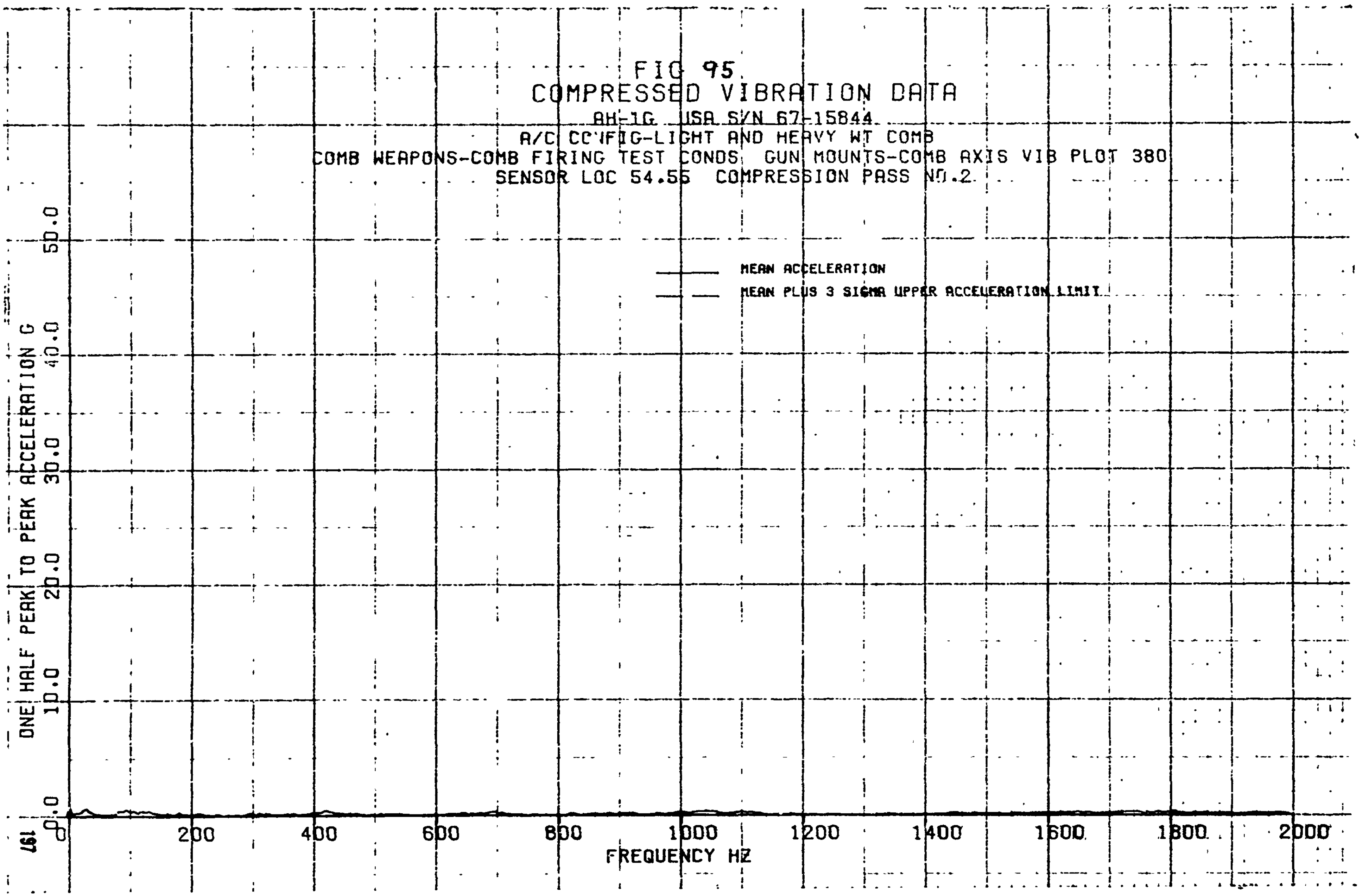
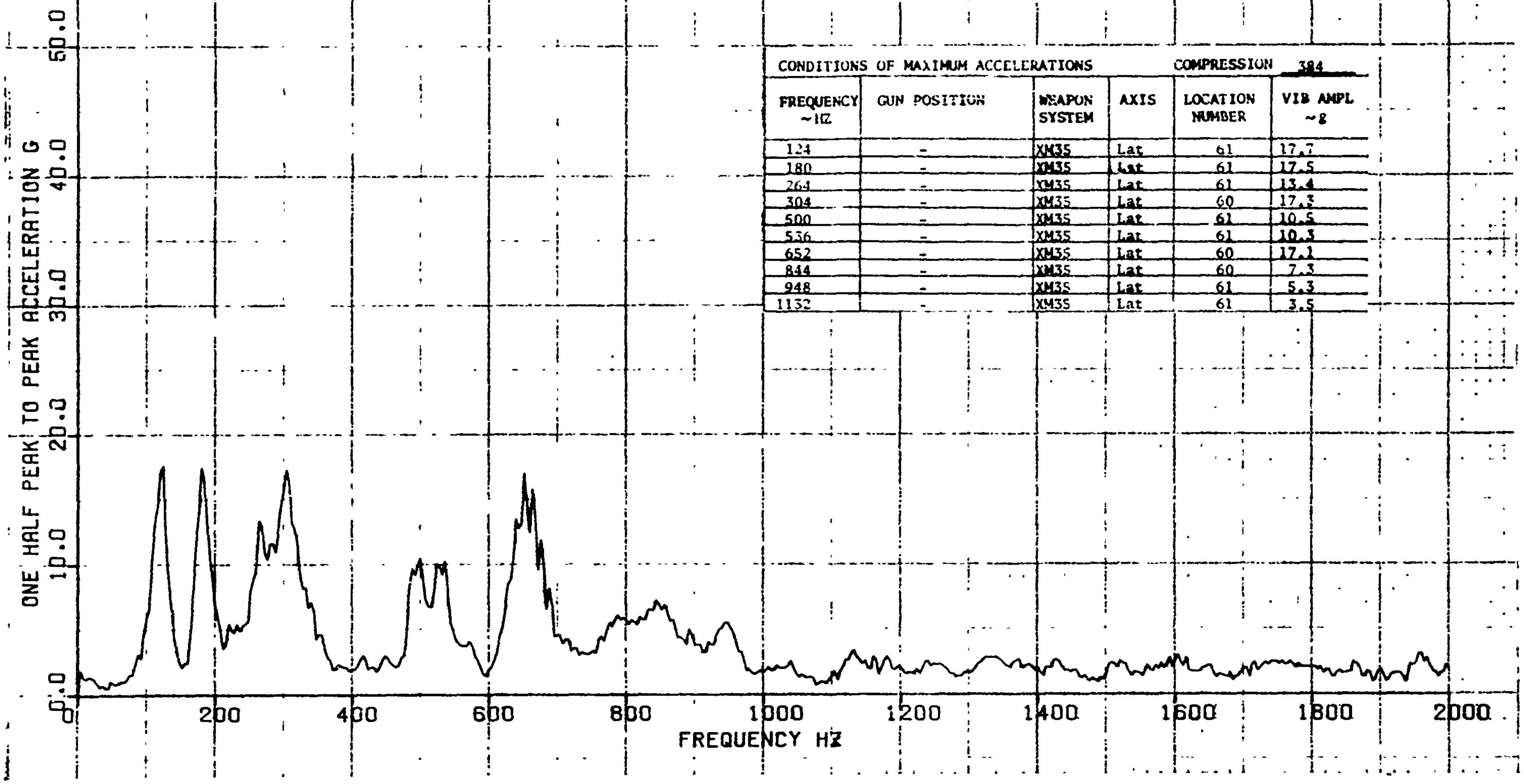


FIG 95
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS GUN MOUNTS-COMB AXIS VIB PLOT 380
SENSOR LOC 54.55 COMPRESSION PASS NO.2
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
10.0
20.0
30.0
40.0
50.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 96
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS FUSELAGE SKIN-COMB AXIS VIB PLOT 384
SENSOR LOC 59.60.61 COMPRESSION PASS NO.2



CONDITIONS OF MAXIMUM ACCELERATIONS — COMPRESSION 384

FREQUENCY ~HZ	GUN POSITION	WEAPON SYSTEM	AXIS	LOCATION NUMBER	VIB AMPL ~g
124	-	XM35	Lat	61	17.7
180	-	XM35	Lat	61	17.5
264	-	XM35	Lat	61	13.4
304	-	XM35	Lat	60	17.3
500	-	XM35	Lat	61	10.5
536	-	XM35	Lat	61	10.3
652	-	XM35	Lat	60	17.1
844	-	XM35	Lat	60	7.3
948	-	XM35	Lat	61	5.3
1132	-	XM35	Lat	61	3.5

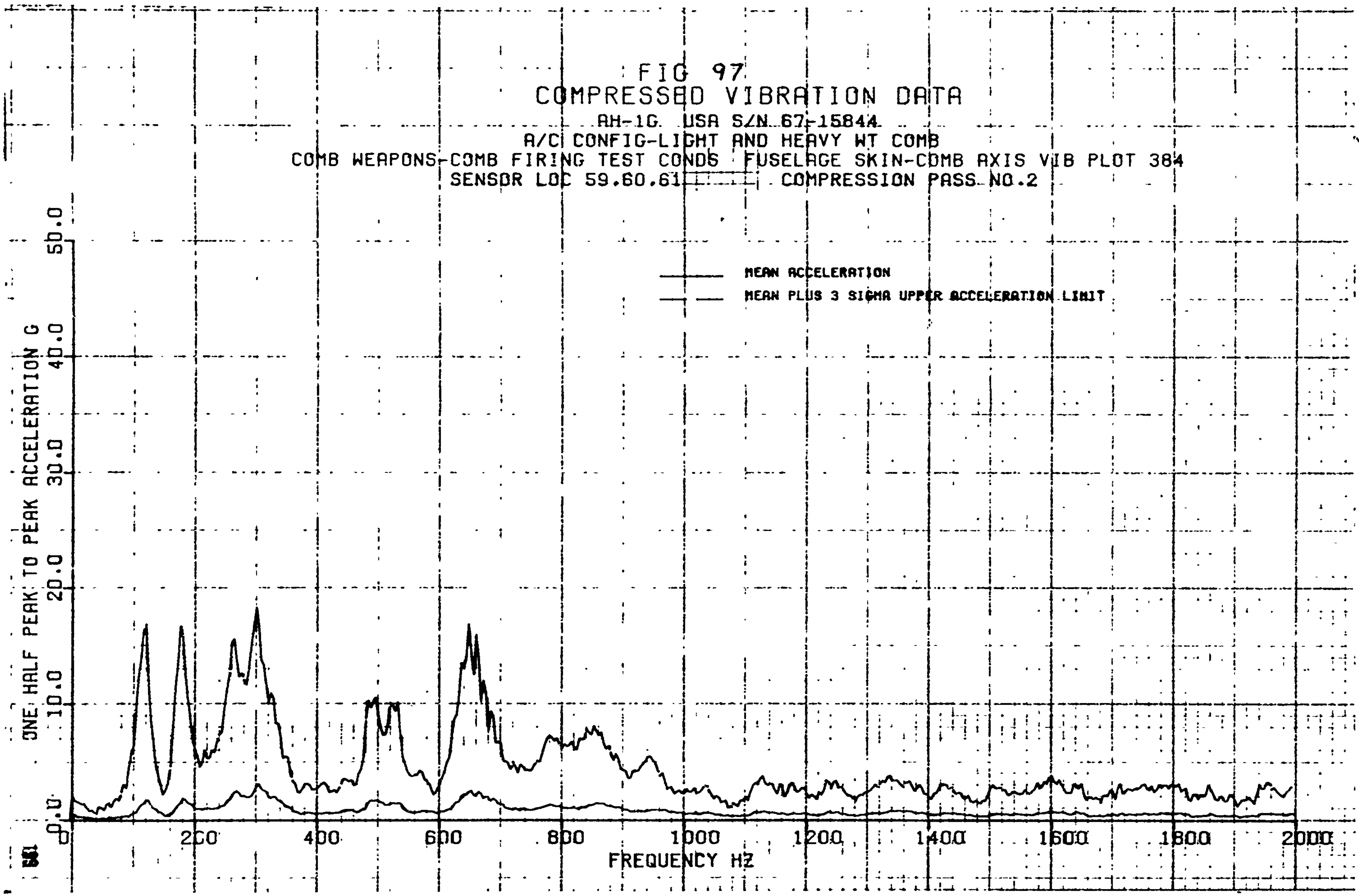
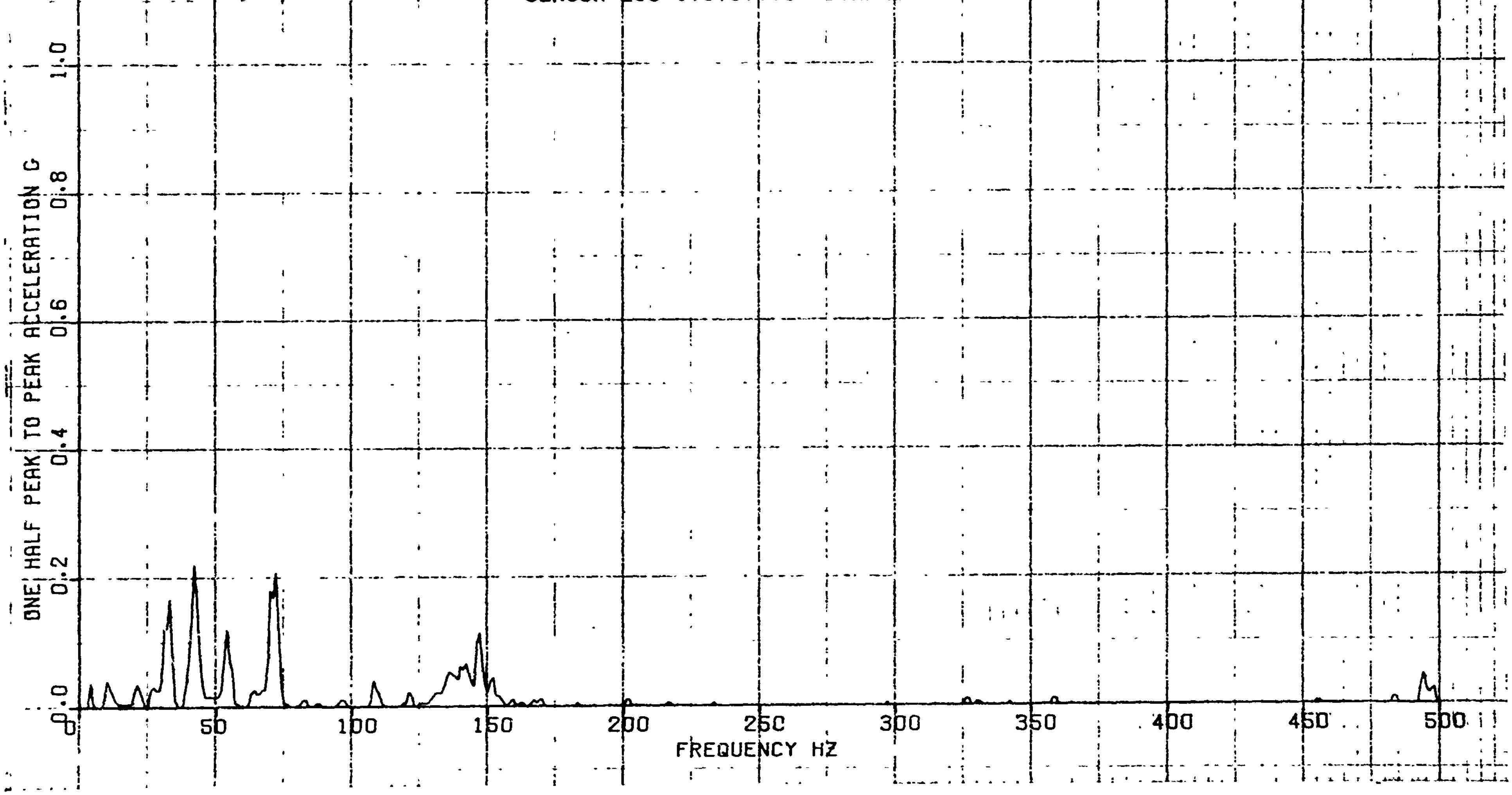


FIG 97
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
COMB WEAPONS-COMB FIRING TEST CONDS FUSELAGE SKIN-COMB AXIS VIB PLOT 384
SENSOR LOC 59.60.61 COMPRESSION PASS NO.2

FIG 98
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-HOVER PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 001
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1



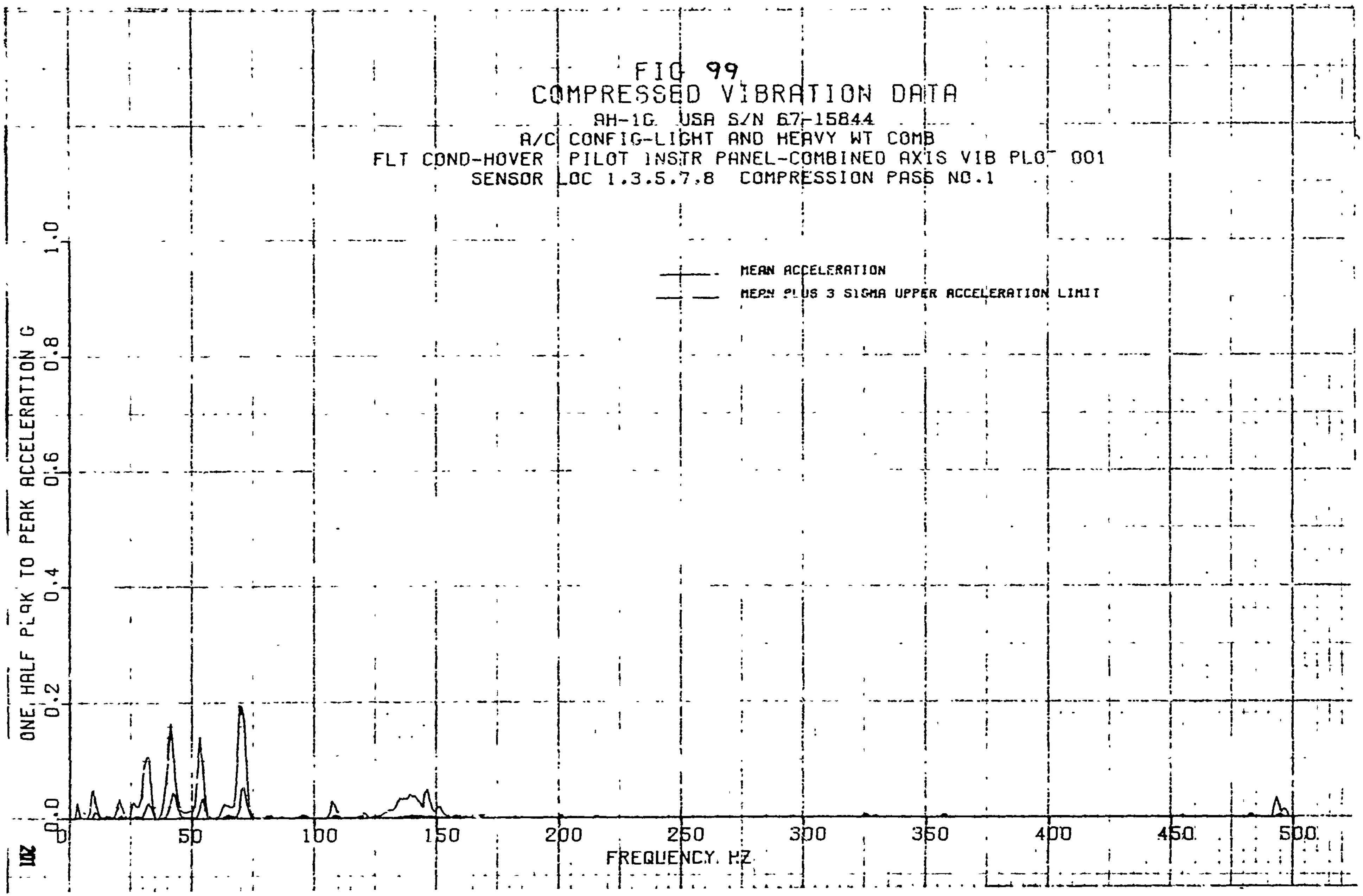


FIG 99
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-HOVER PILOT INSTR PANEL-COMBINED AXIS VIB PLO 001
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY, HZ

FIG 100

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-TRANS PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 002

SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1

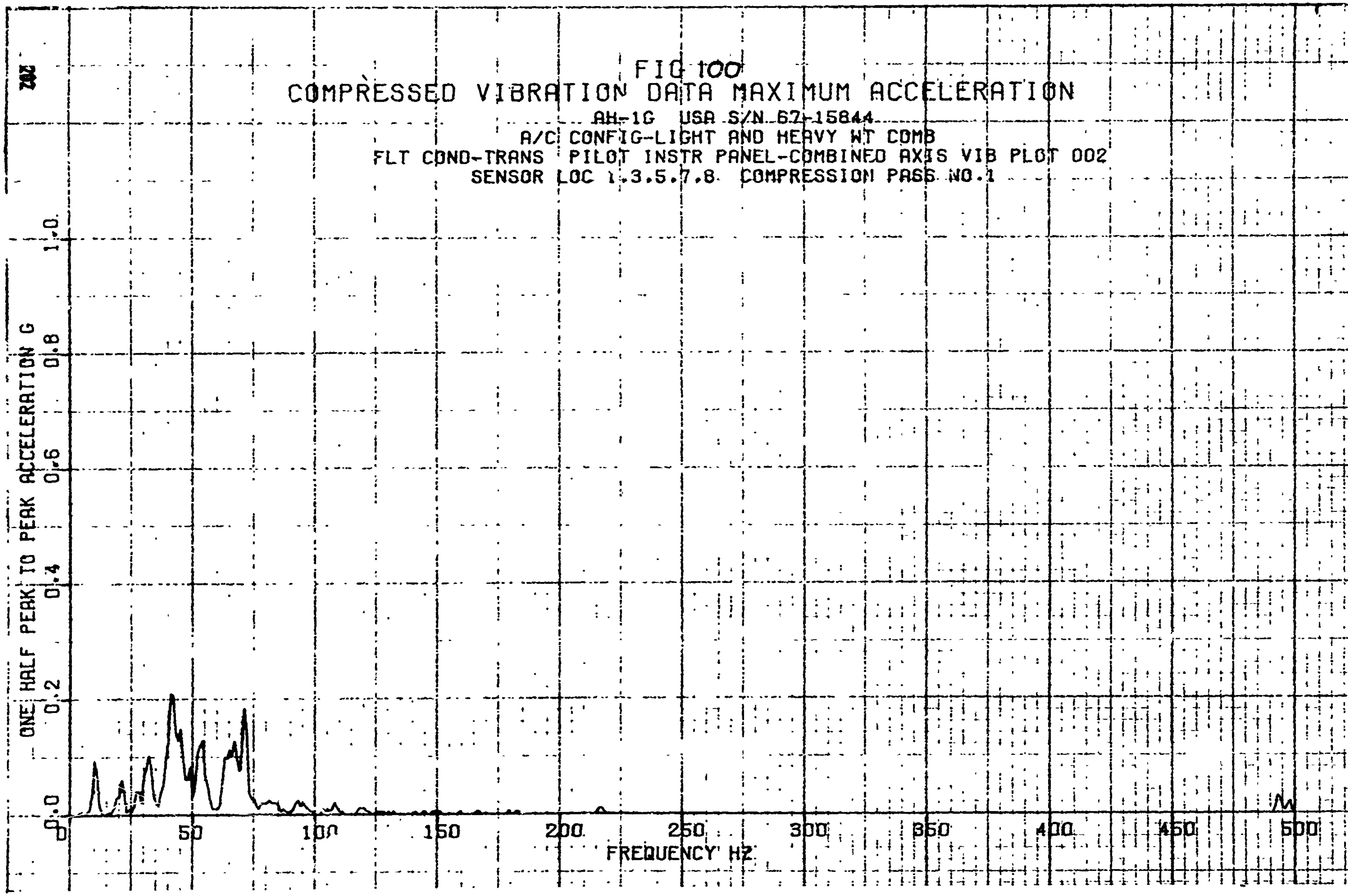
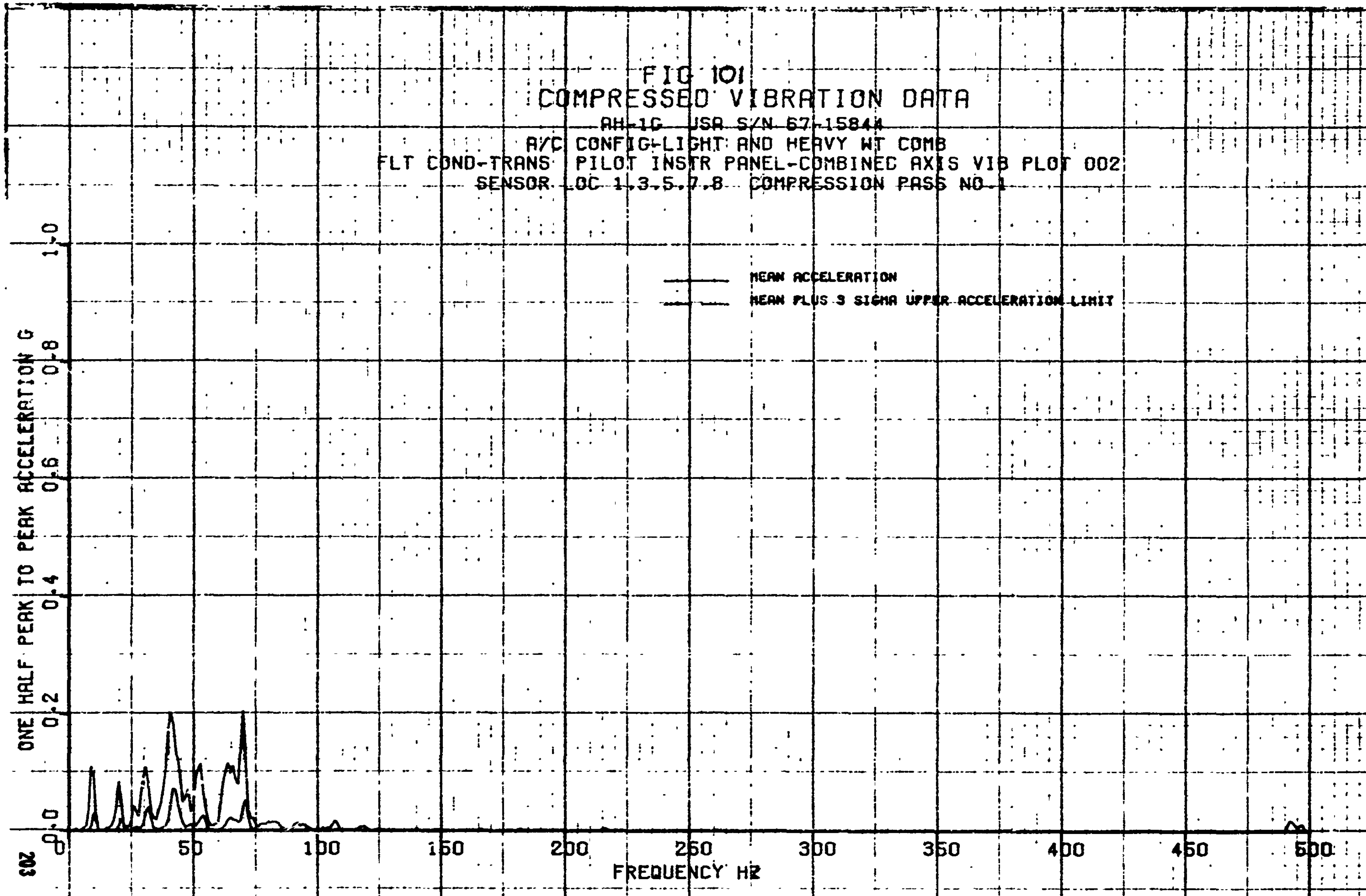


FIG 101


COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TRANS PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 002
SENSOR LOC 1,3,5,7,8 COMPRESSION PASS NO 1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

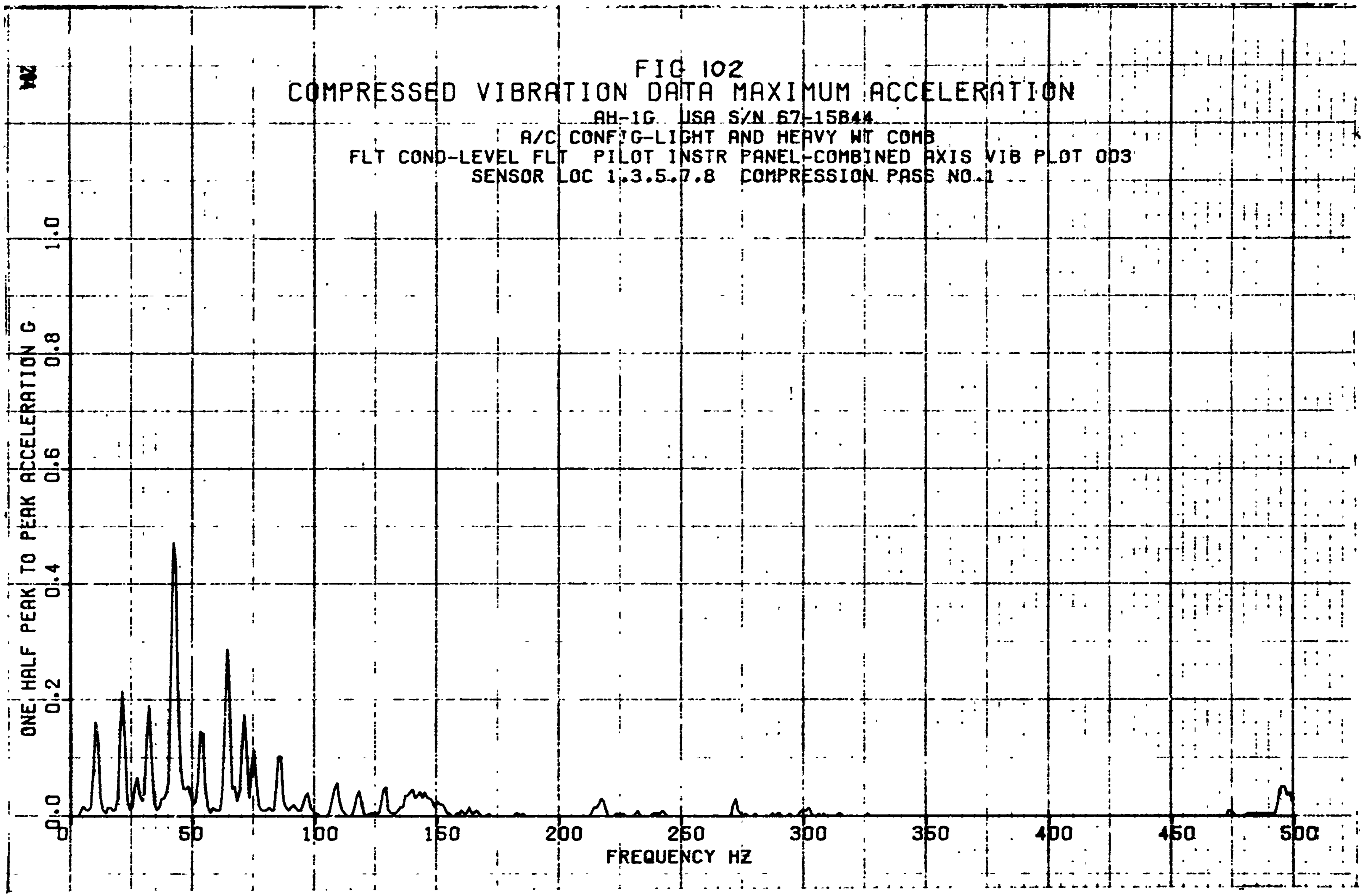
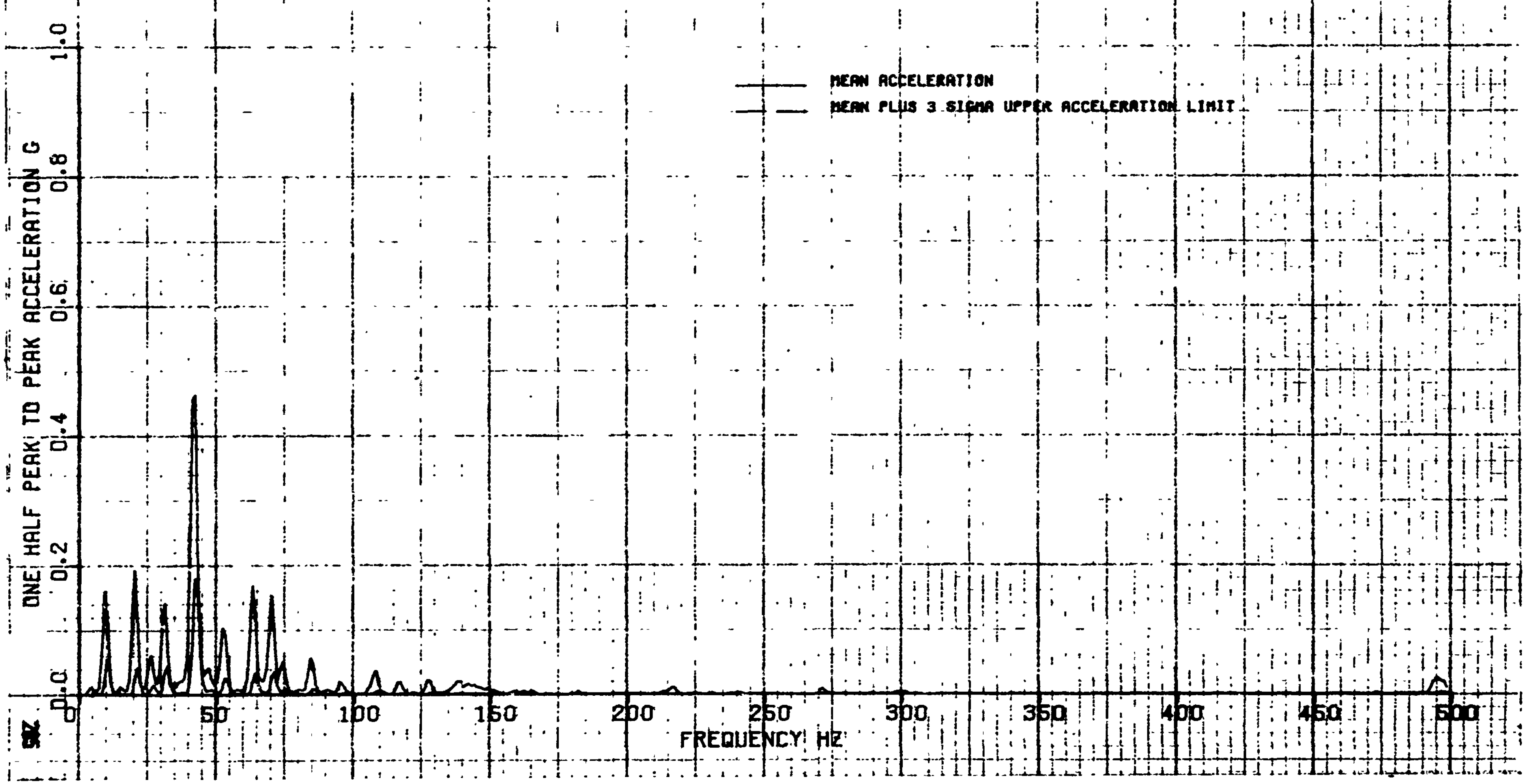


FIG 102
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LEVEL FLT PILOT INSTR PANEL-COMBINED AXIS VIB PLOT OD3
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 103
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LEVEL FLT PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 003
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1



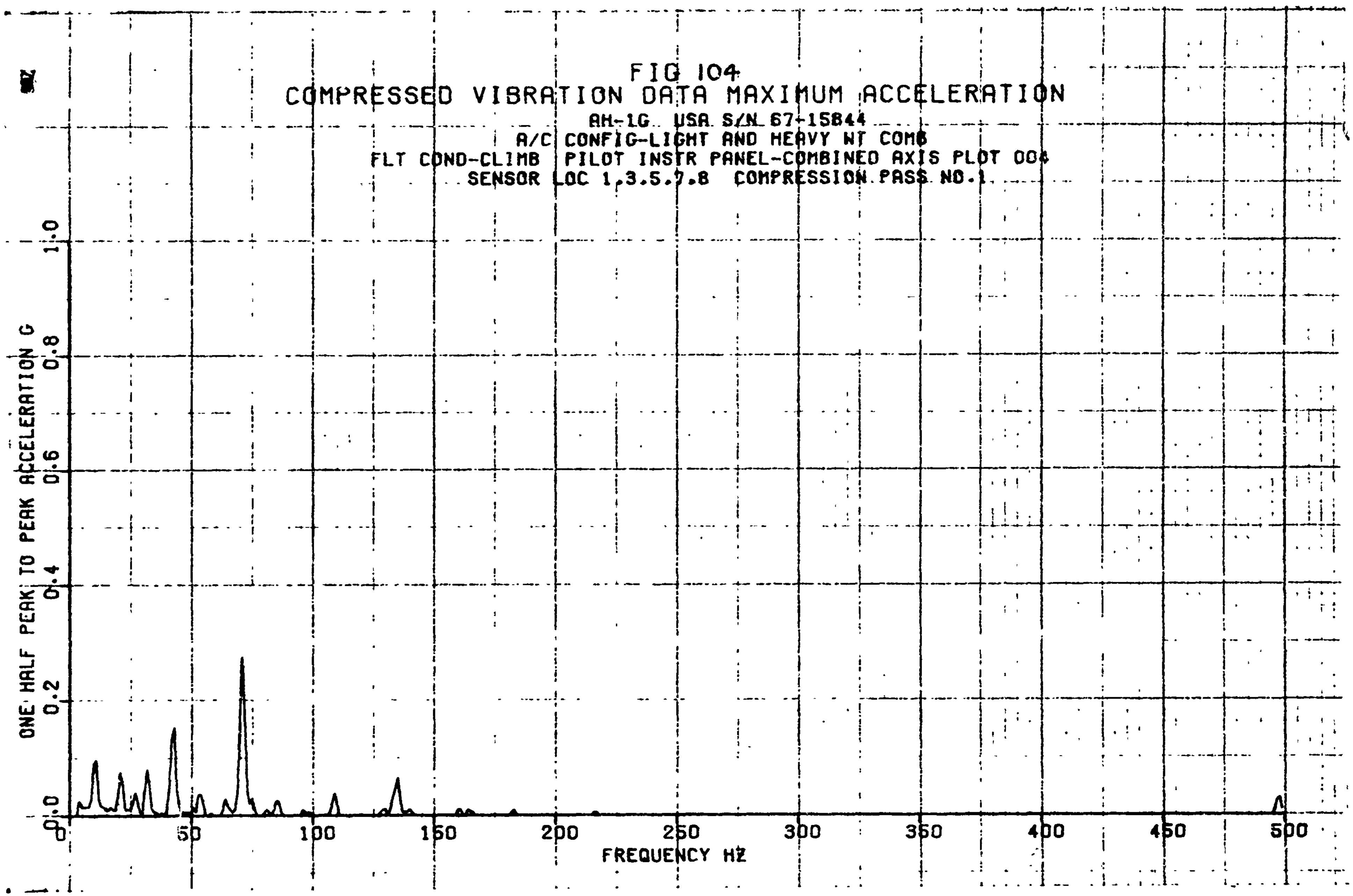


FIG 104
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-CLIMB PILOT INSTR PANEL-COMBINED AXIS PLOT 004
SENSOR LOC 1,3.5.7.8 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

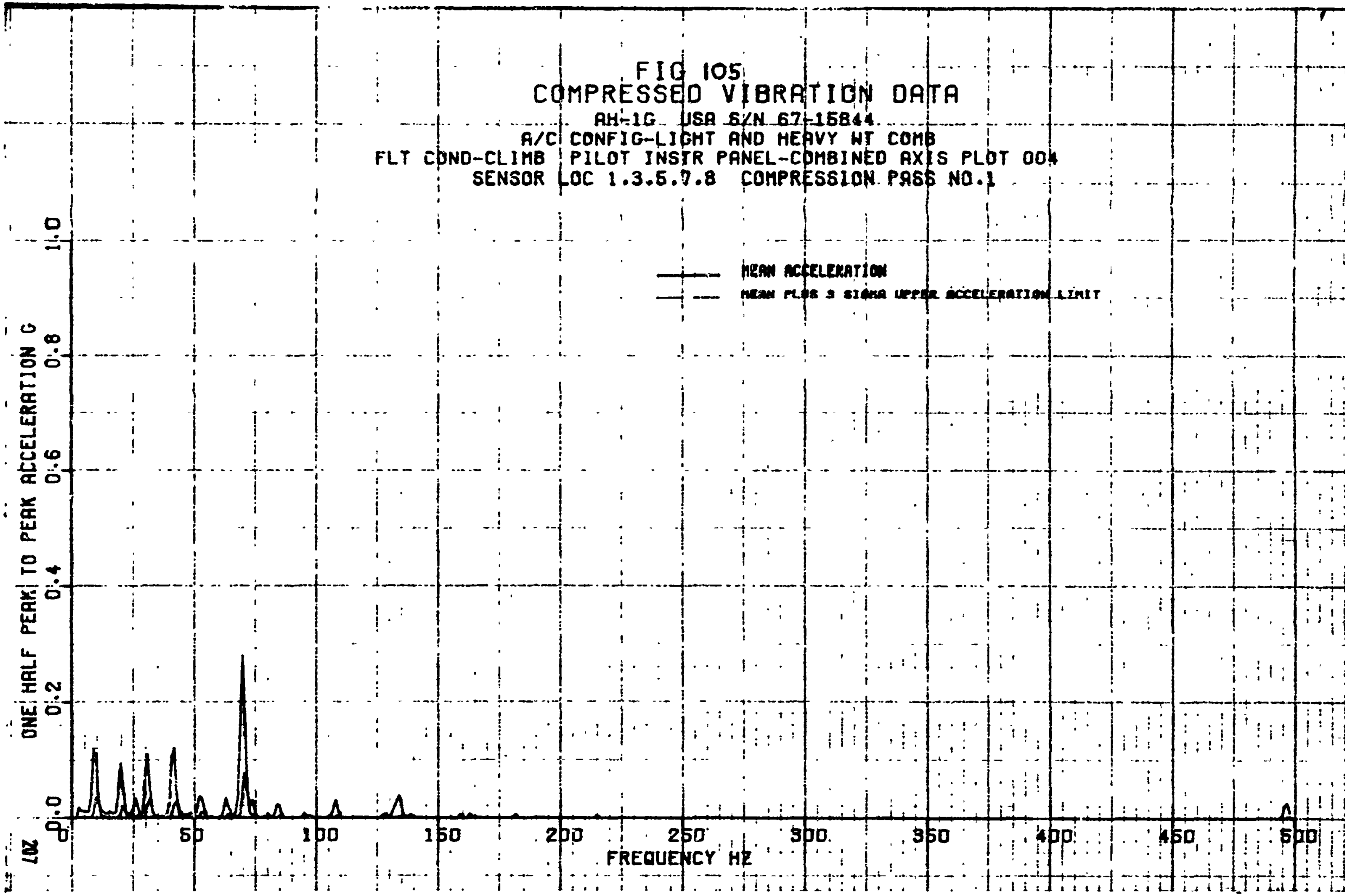
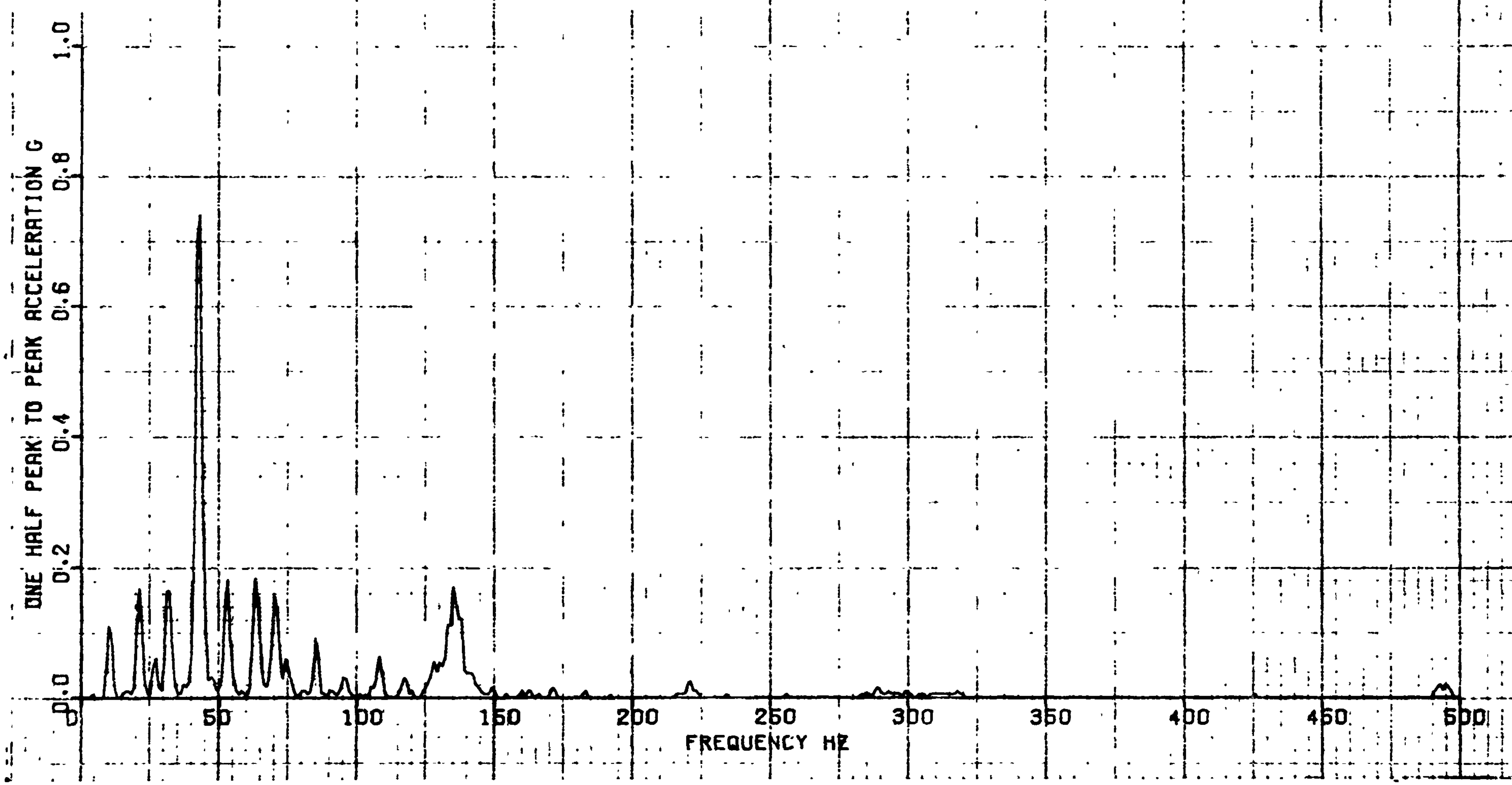


FIG 105
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-CLIMB PILOT INSTR PANEL-COMBINED AXIS PLOT 004
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1

FIG 106
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-DESCENT PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 005
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1



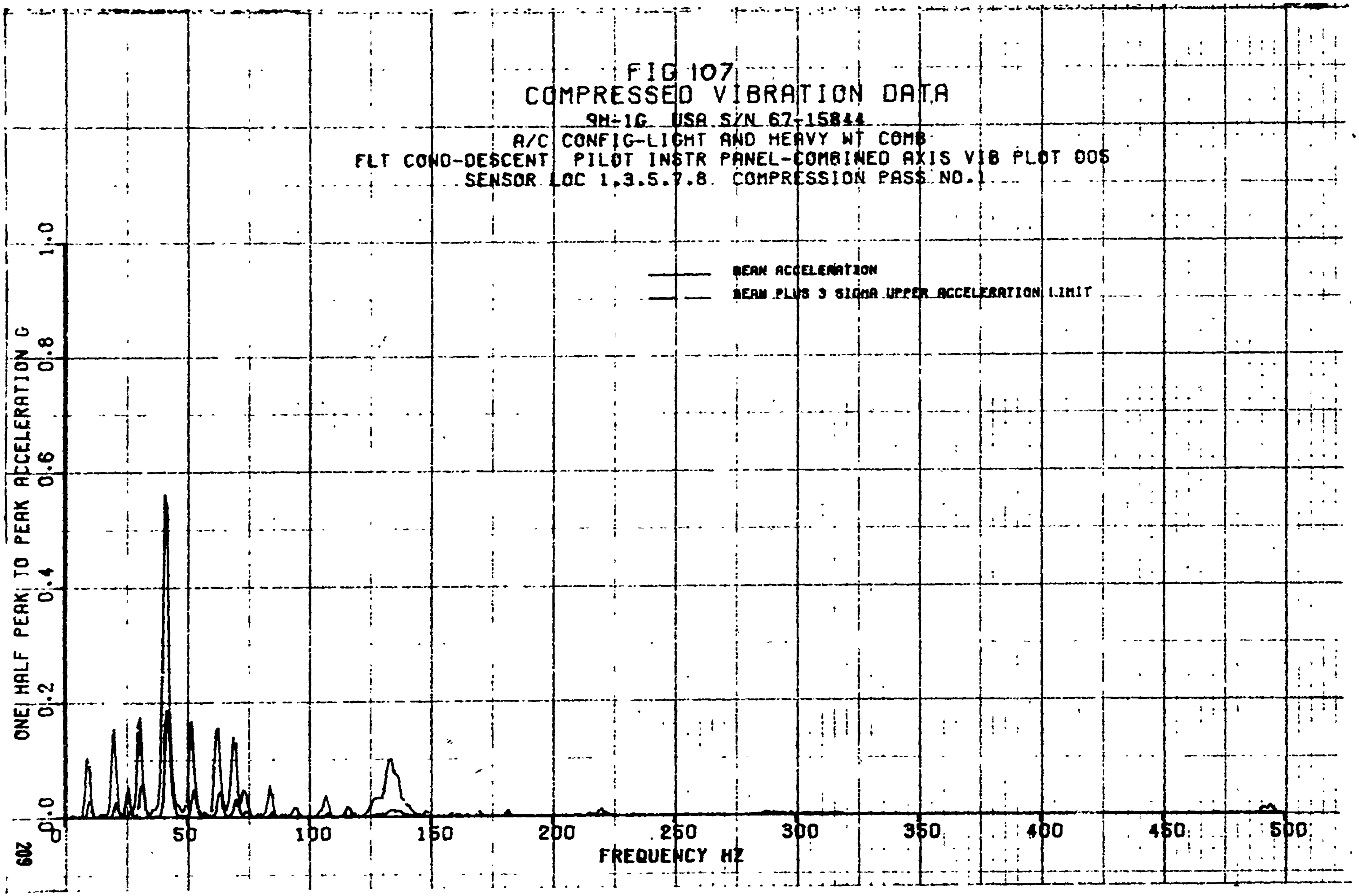


FIG 107
COMPRESSED VIBRATION DATA
9H-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-DESCENT PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 005
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 108
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TAKEOFF PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 006
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1

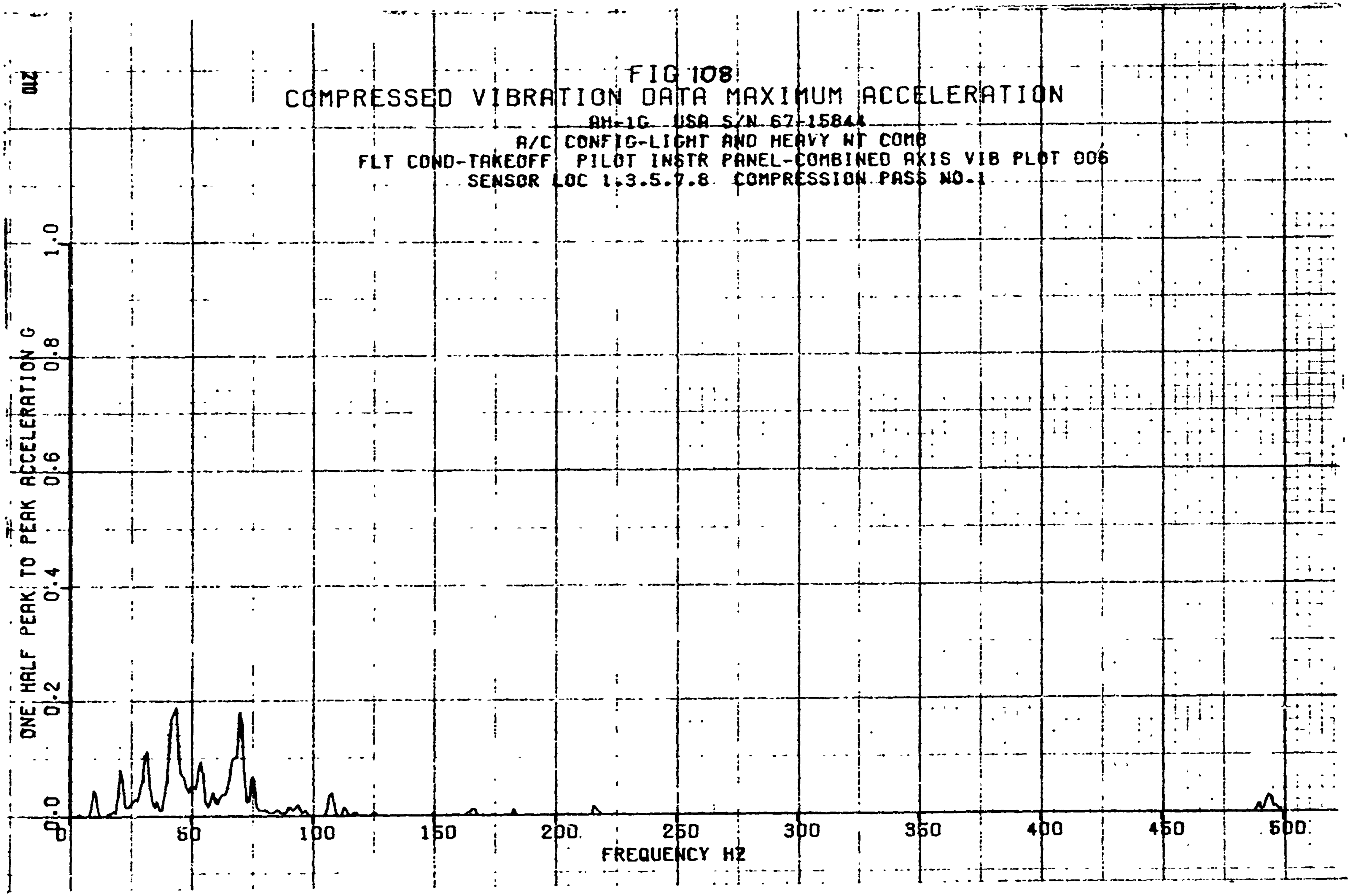


FIG 109
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TAKEOFF PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 006
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1

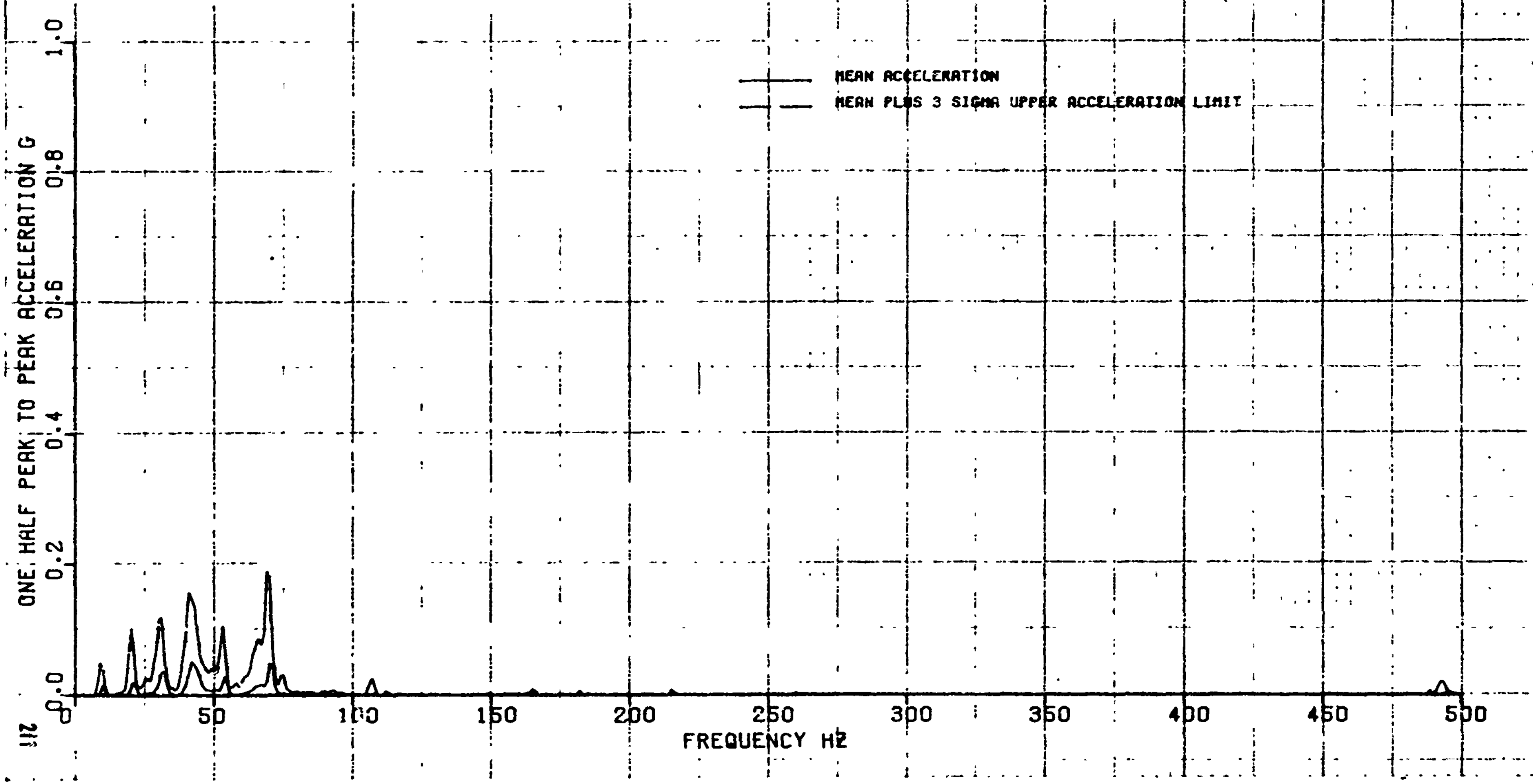


FIG 110

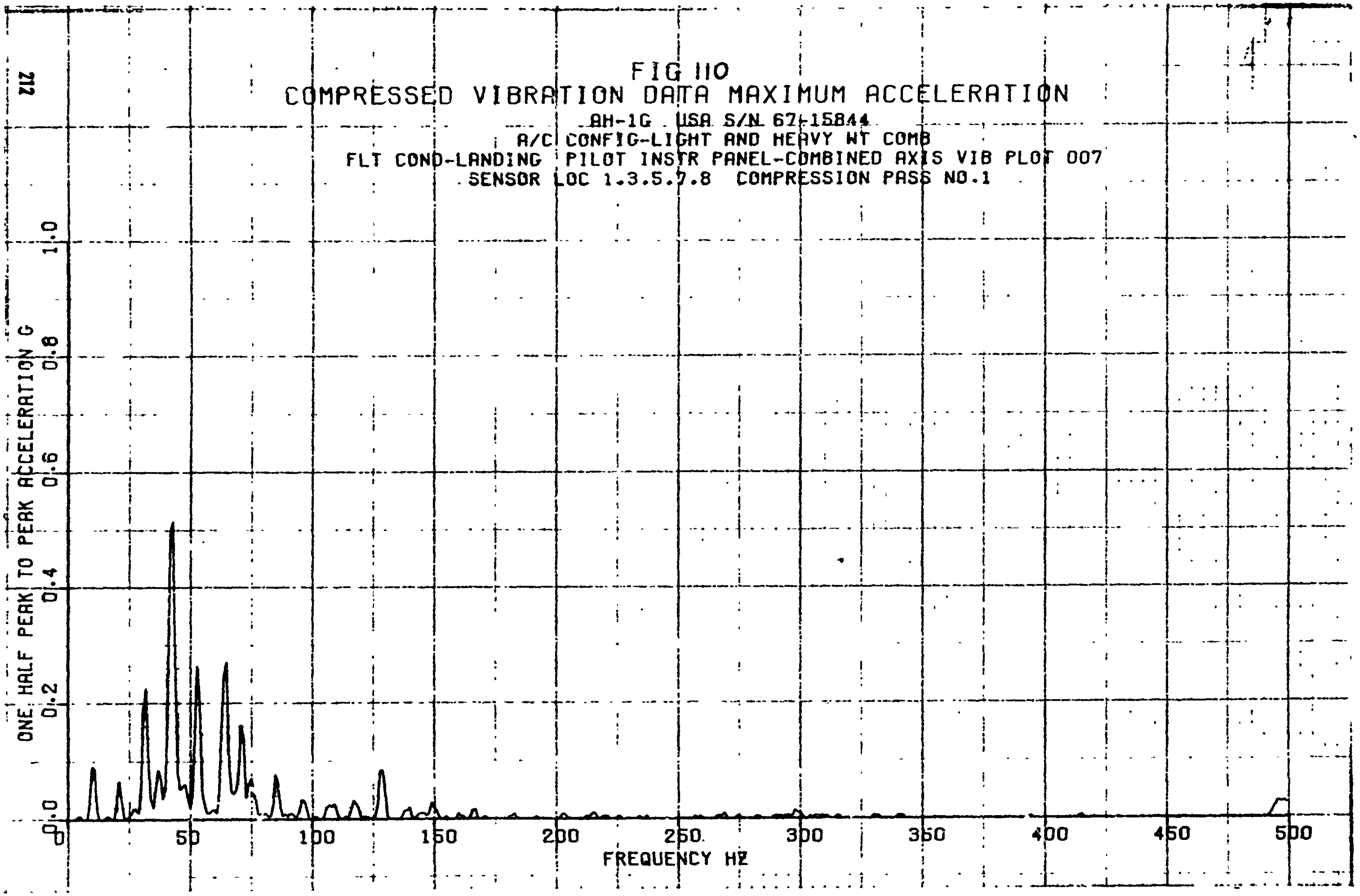
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-LANDING PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 007

SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1



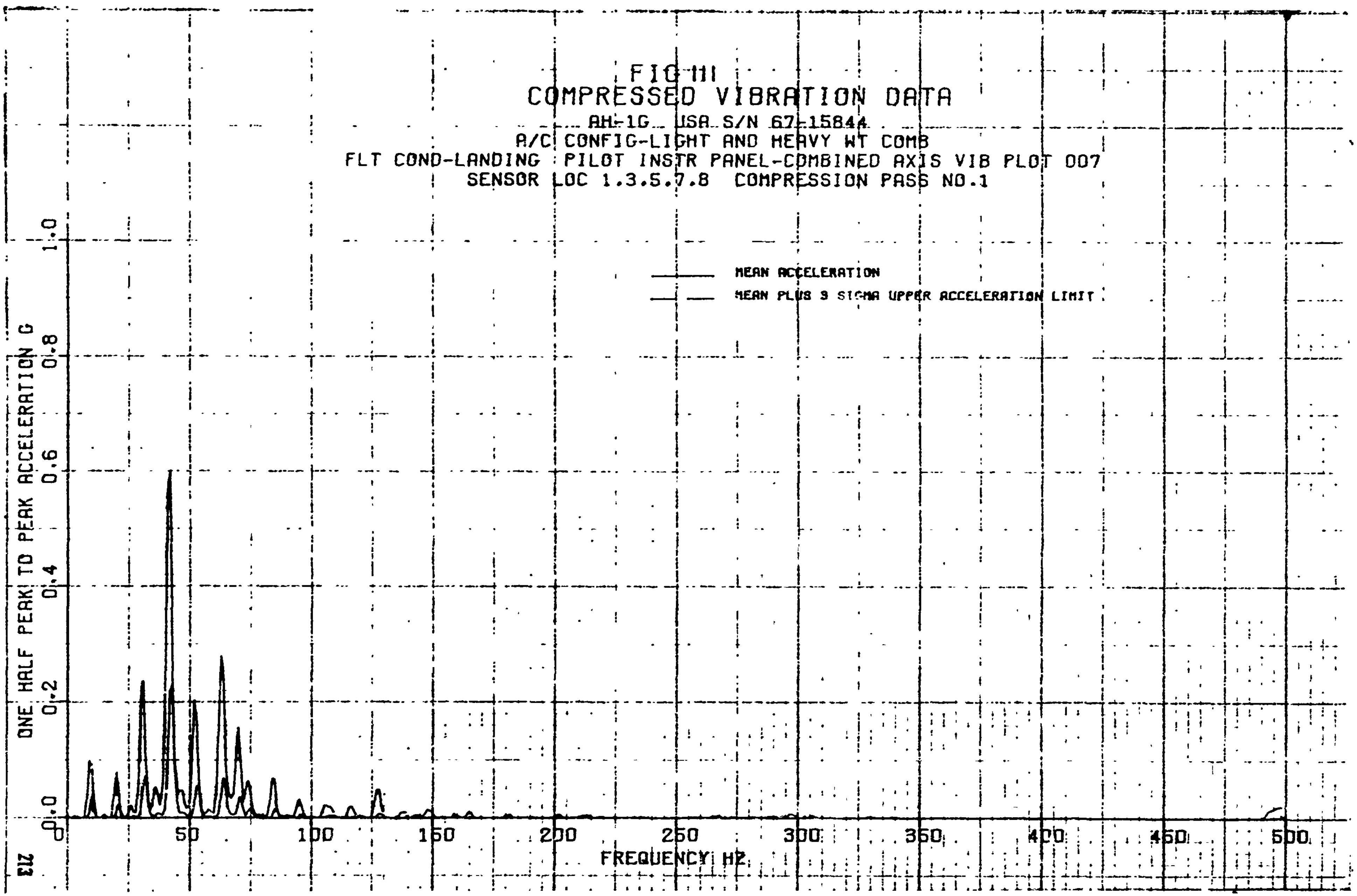


FIG 111
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LANDING PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 007
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 112

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-MANEUVERING PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 008

SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1

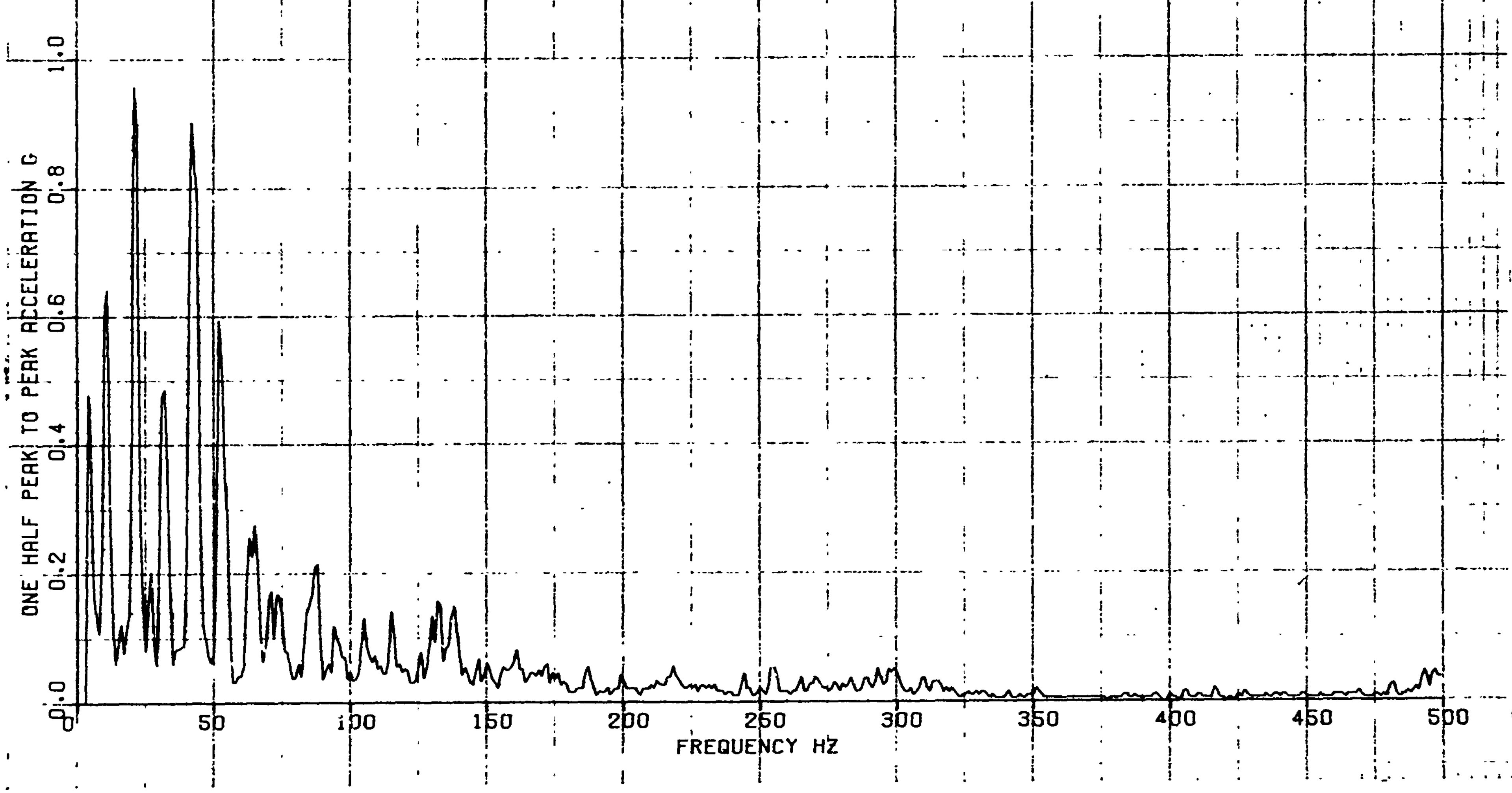


FIG 113
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-MANEUVERING PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 008
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1

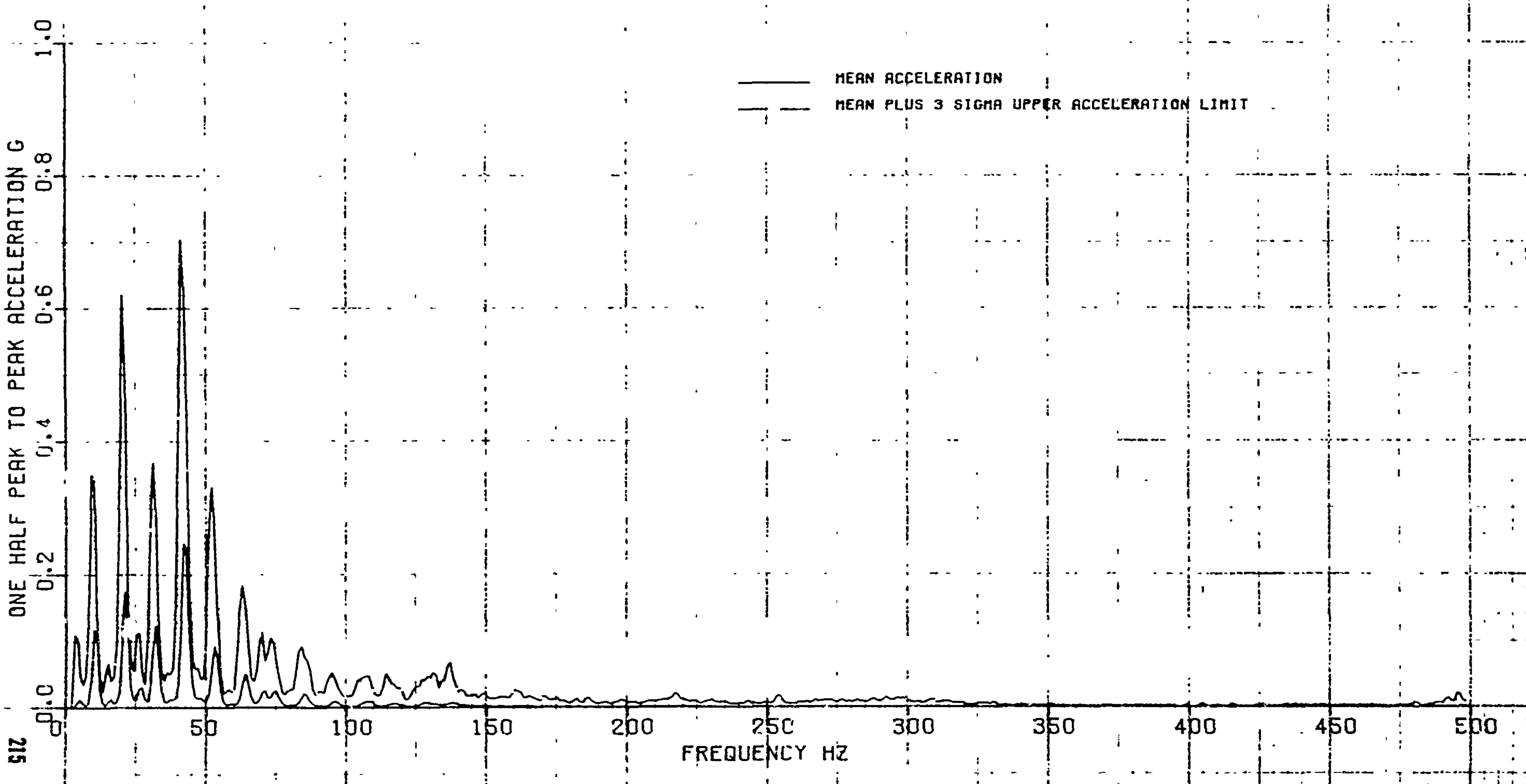


FIG 114

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

GND TEST COND-GND/FLT IDLE PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 009

SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1

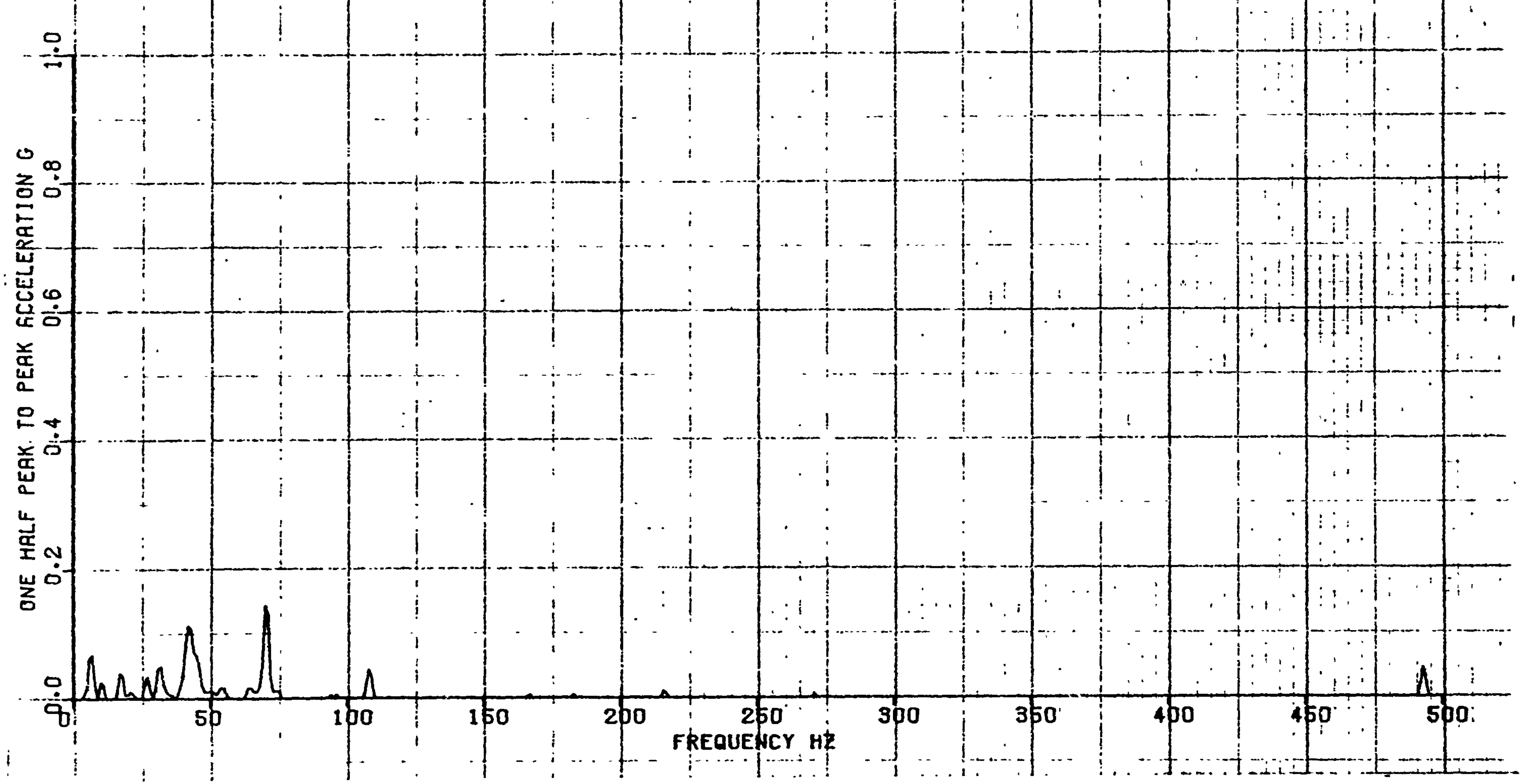


FIG 115

COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844

A/C CONFIC LIGHT AND HEAVY WT COMB

GND TEST COND-GND/FLT IDLE PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 009

SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1

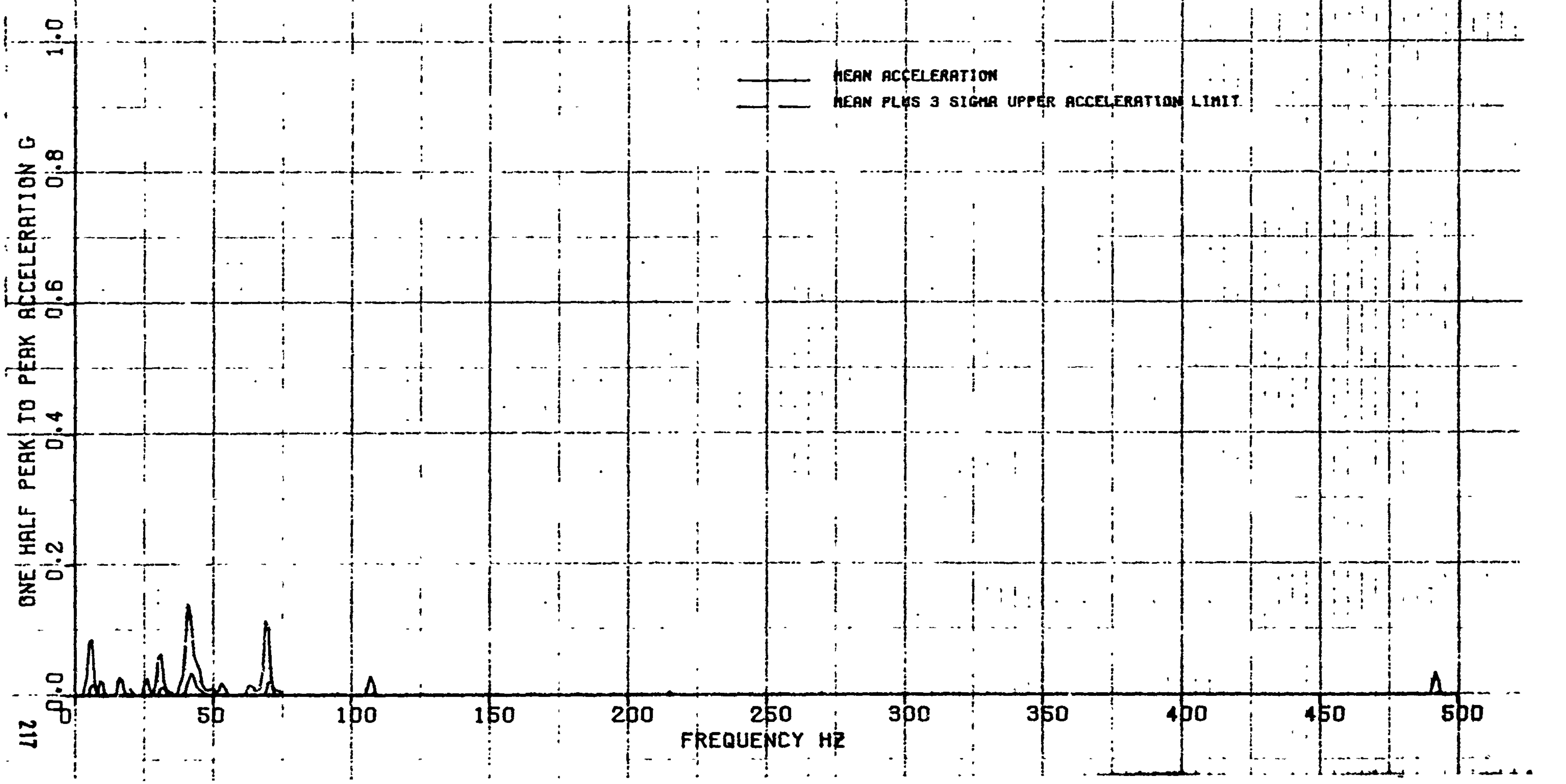


FIG 116

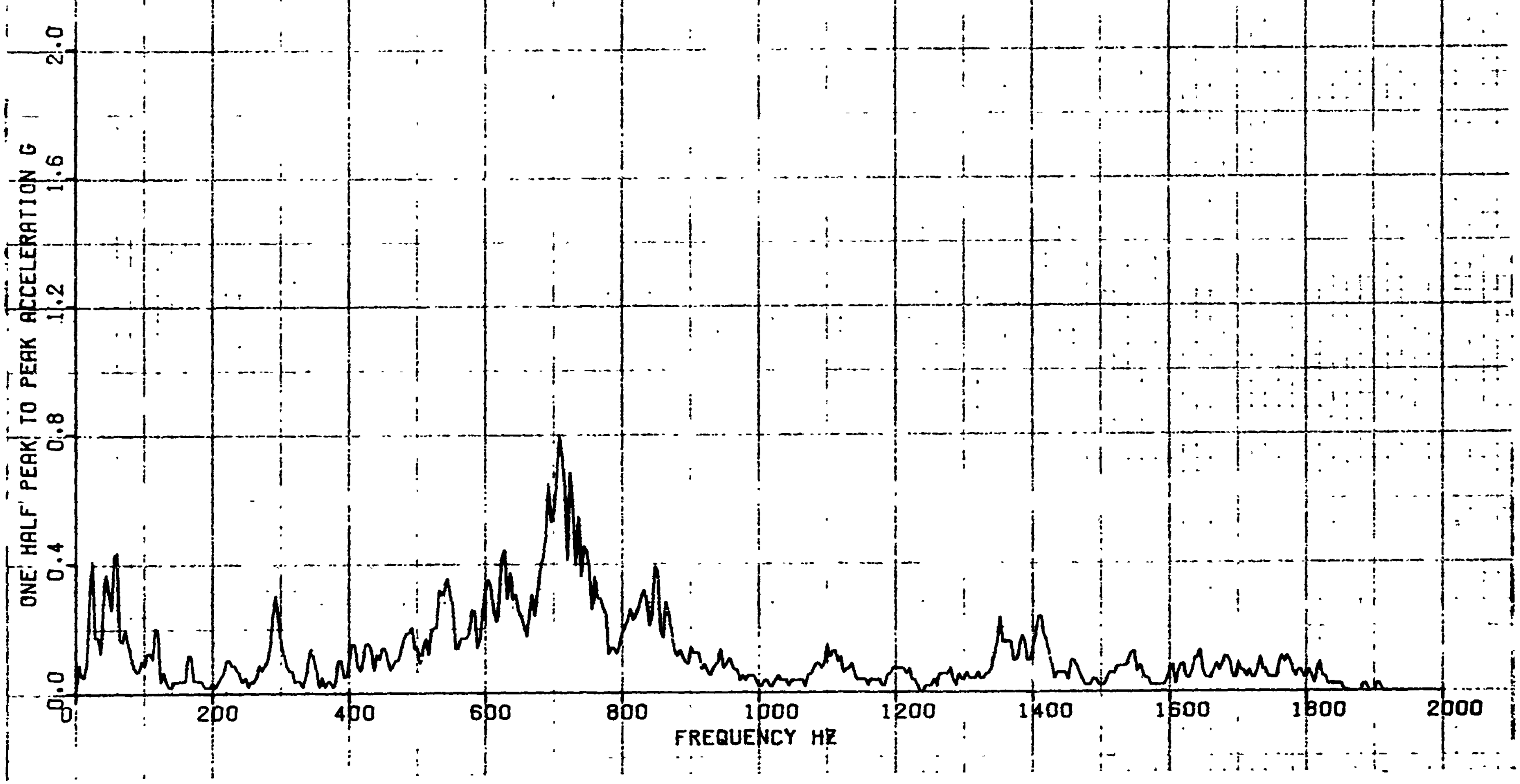
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-FIRING XM134 7.62MM PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 010

SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1



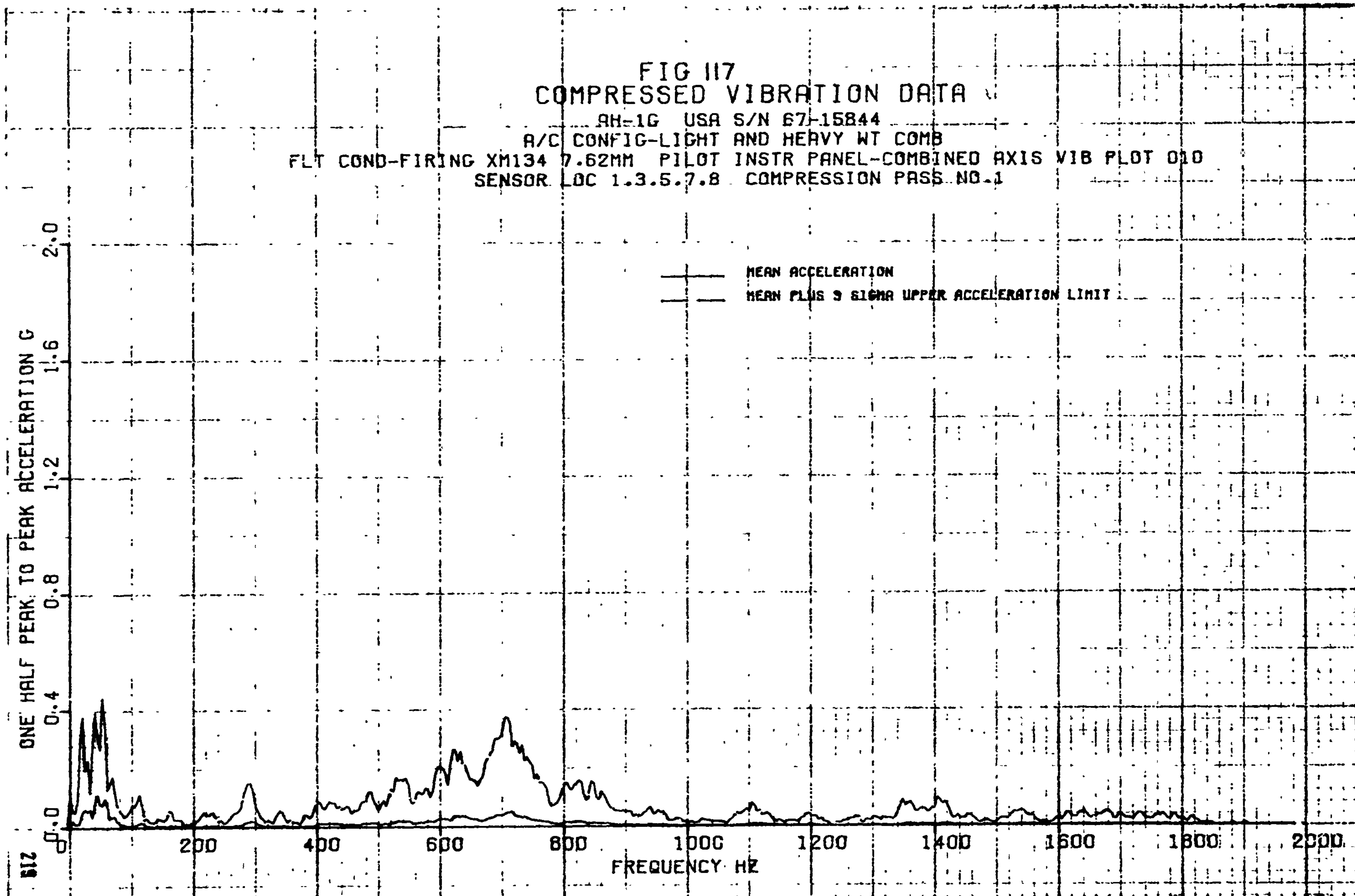


FIG 117
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM134 7.62MM PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 010
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 118

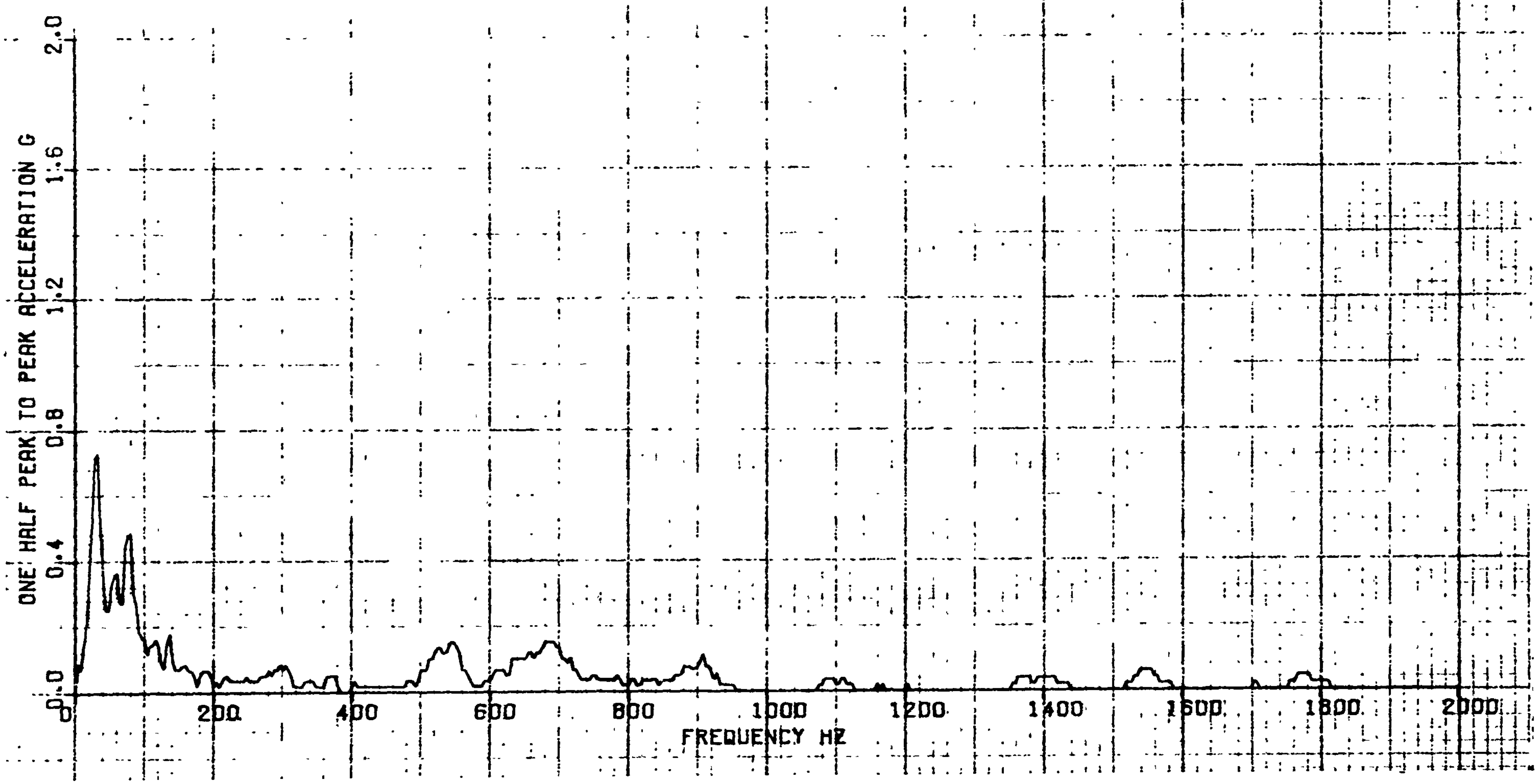
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-FIRING XM129 40MM GRENADE PILOT INSTR PANEL-COMB AXIS VIB PLOT 011

SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1



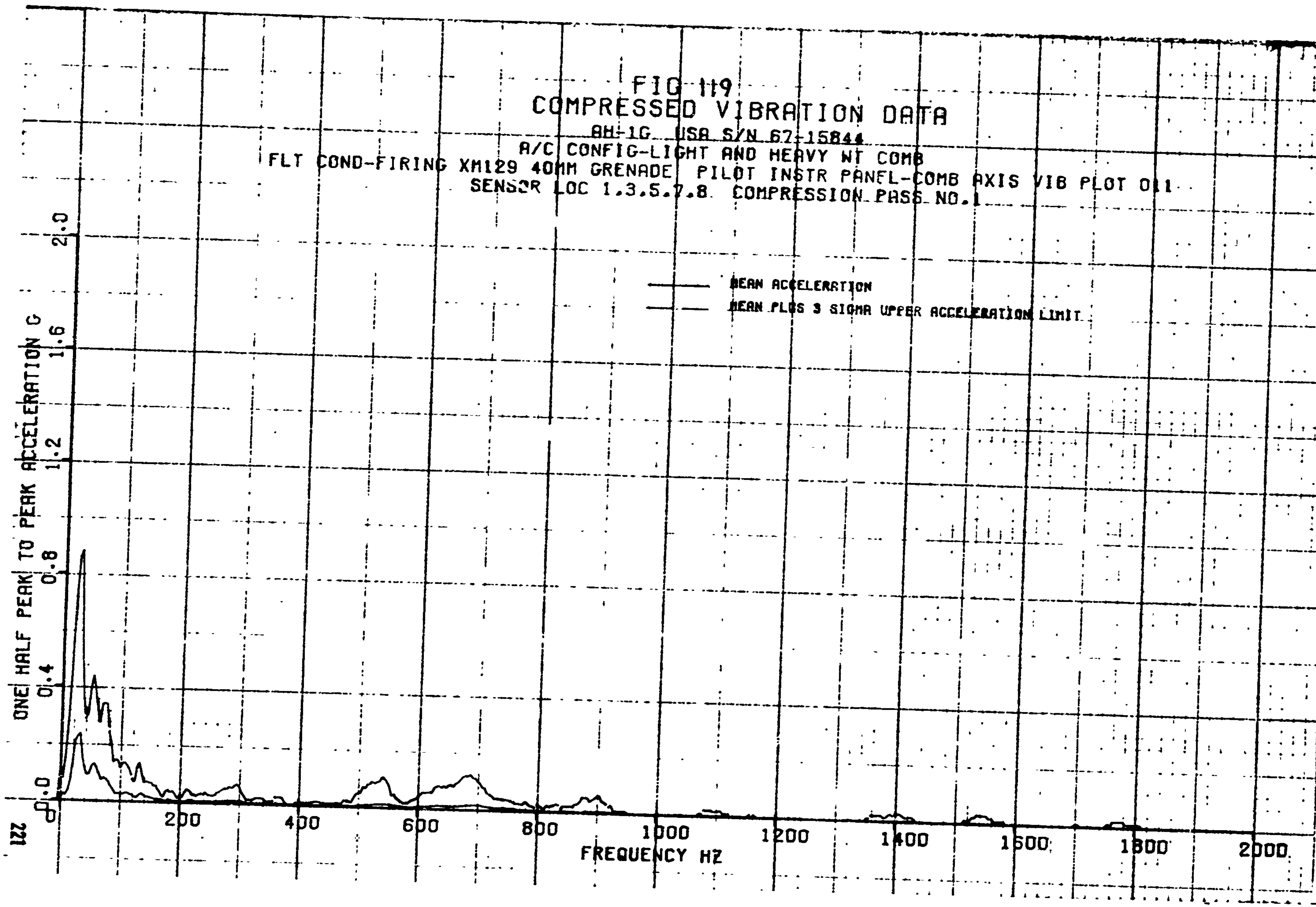


FIG 119
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM129 40MM GRENADE PILOT INSTR PANEL-COMB AXIS VIB PLOT 011
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 120

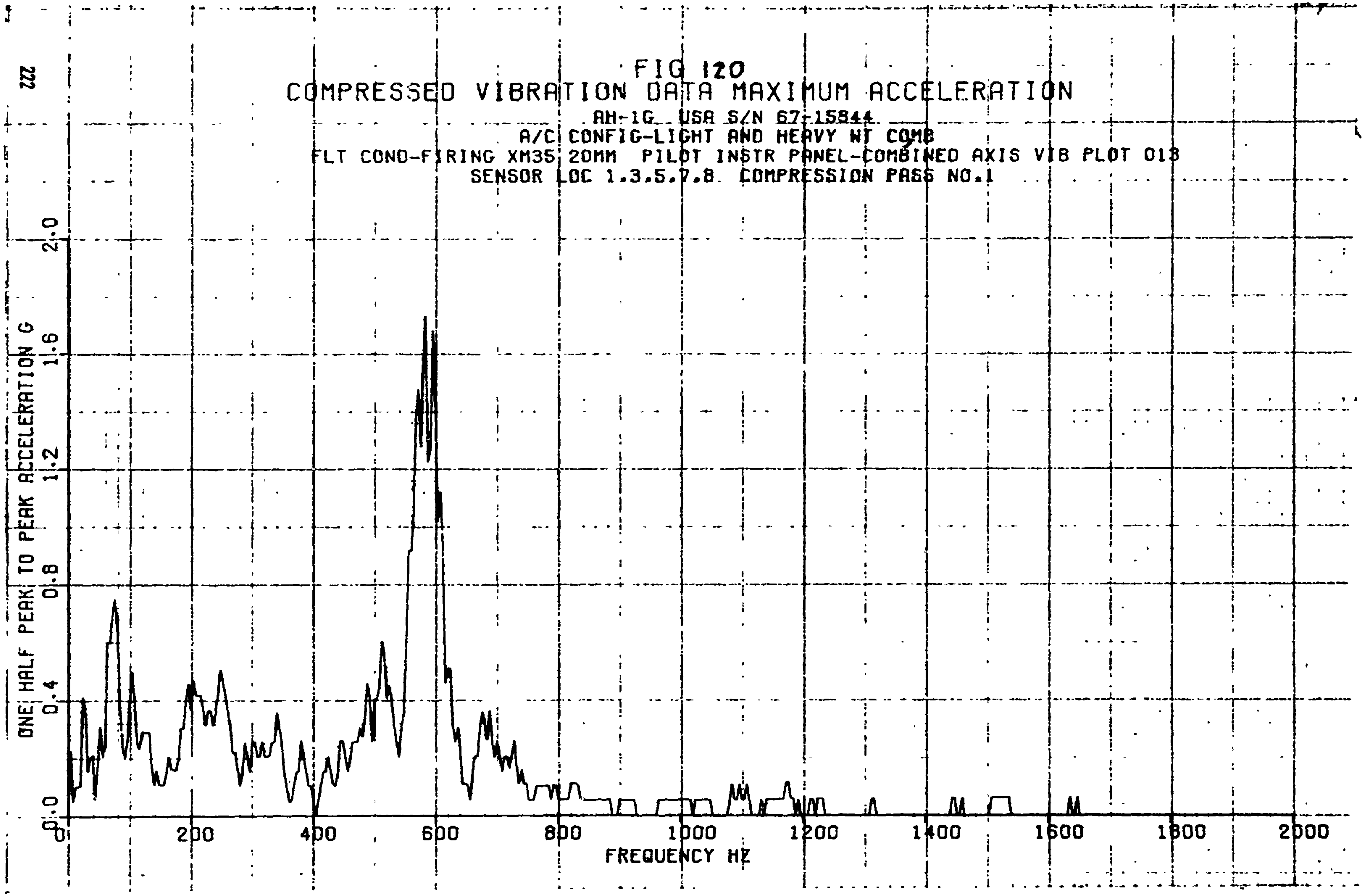
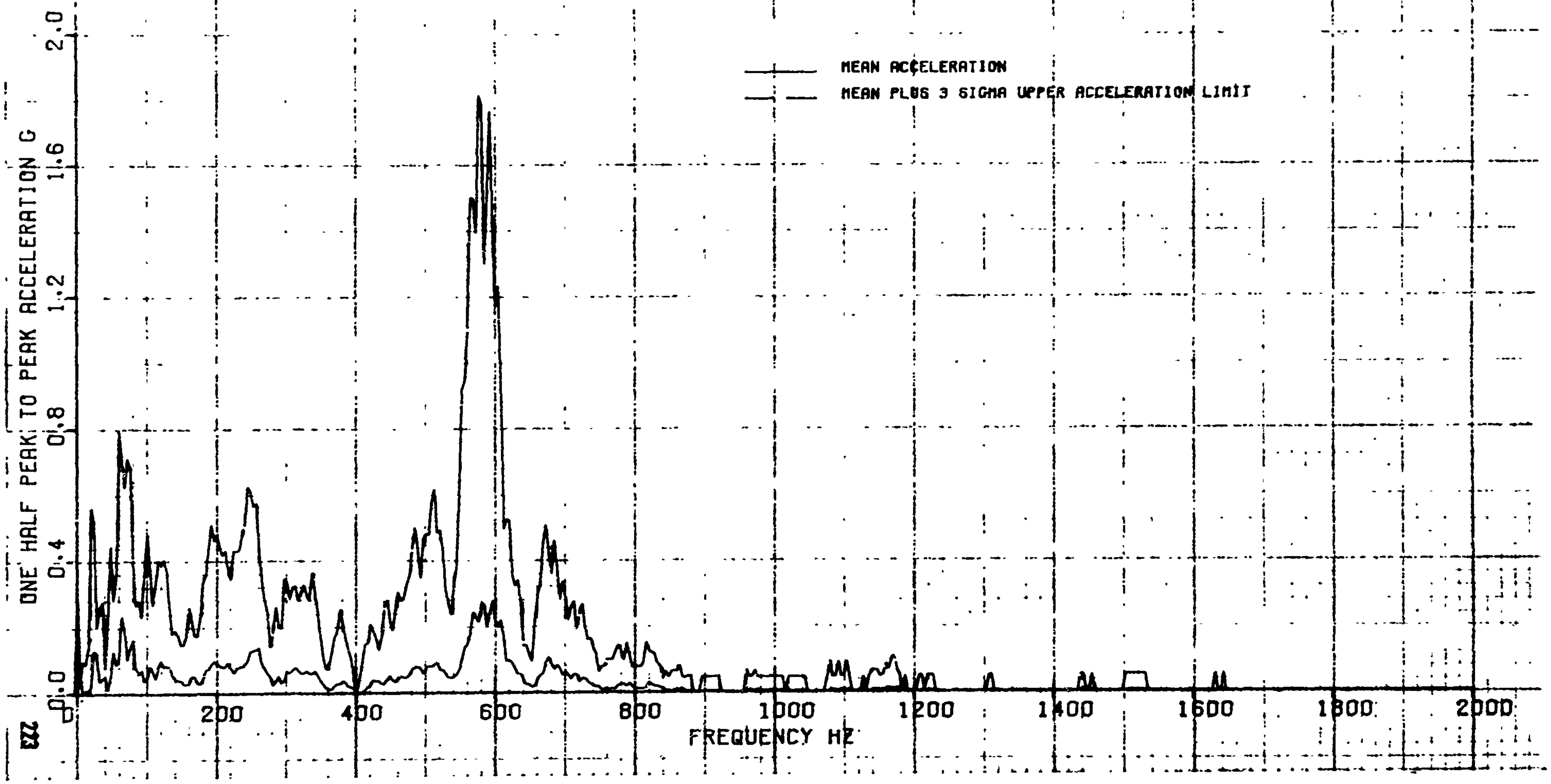

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM35 20MM PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 013
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 121
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM35 20MM PILOT INSTR PANEL-COMBINED AXIS VIB PLOT 018
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1



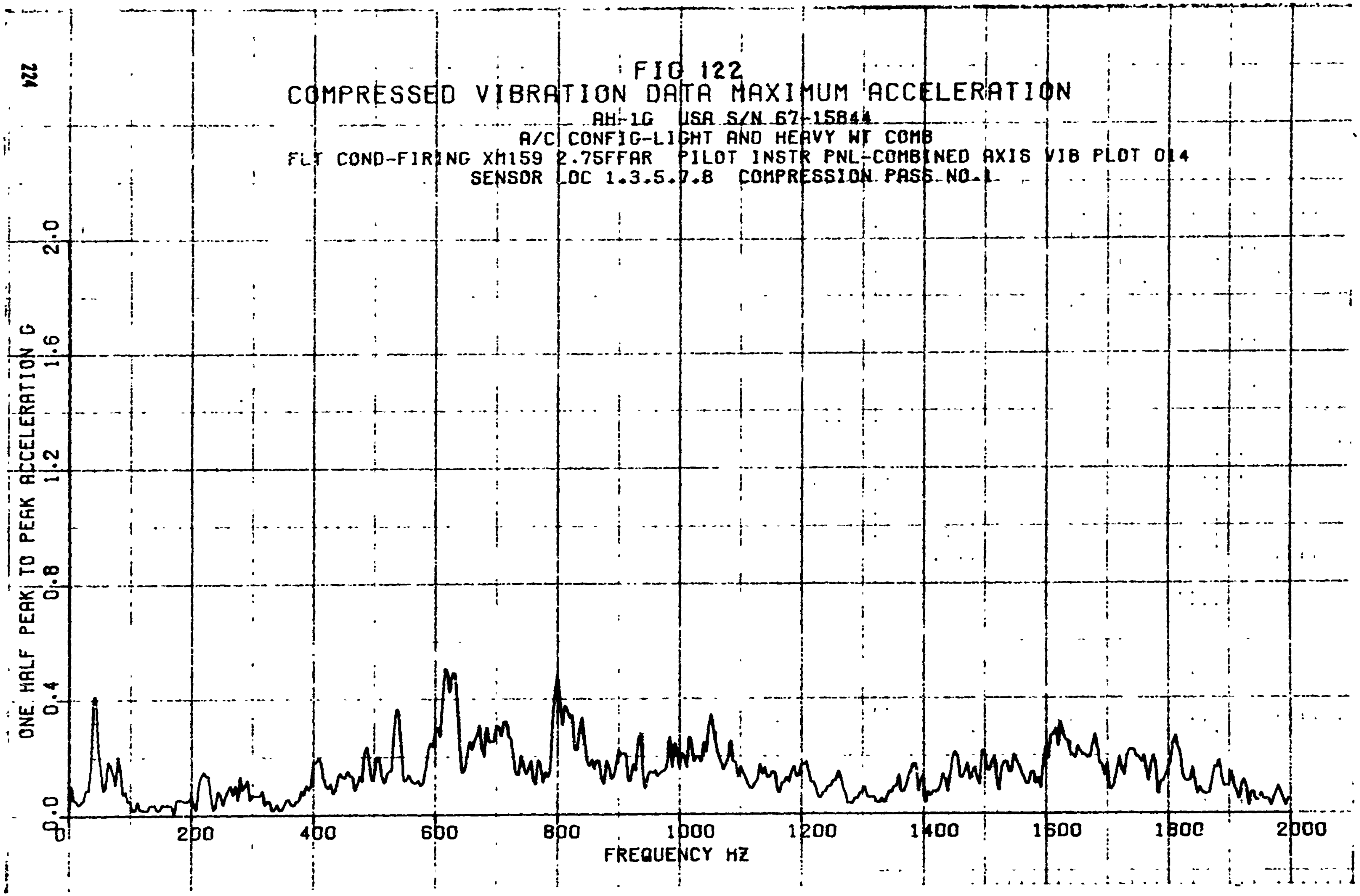


FIG 122
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM159 2.75FFAR PILOT INSTR PNL-COMBINED AXIS VIB PLOT 014
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1

FIG 123
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM159 2.75FFAR PILOT INSTR PNL-COMBINED AXIS VIB PLOT 014
SENSOR LOC 1.3.5.7.8 COMPRESSION PASS NO.1

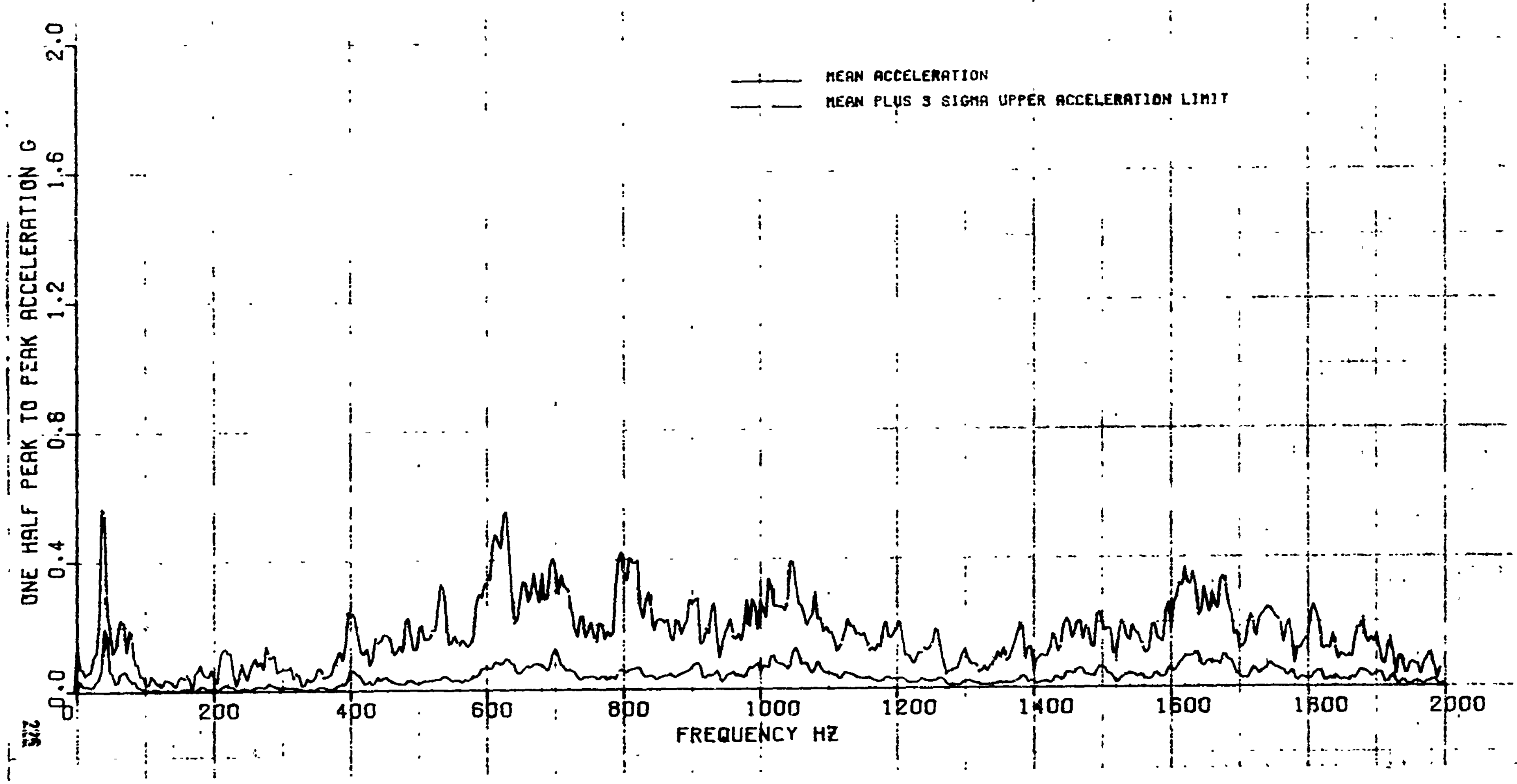


FIG 124
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15804
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-HOVER GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 029
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

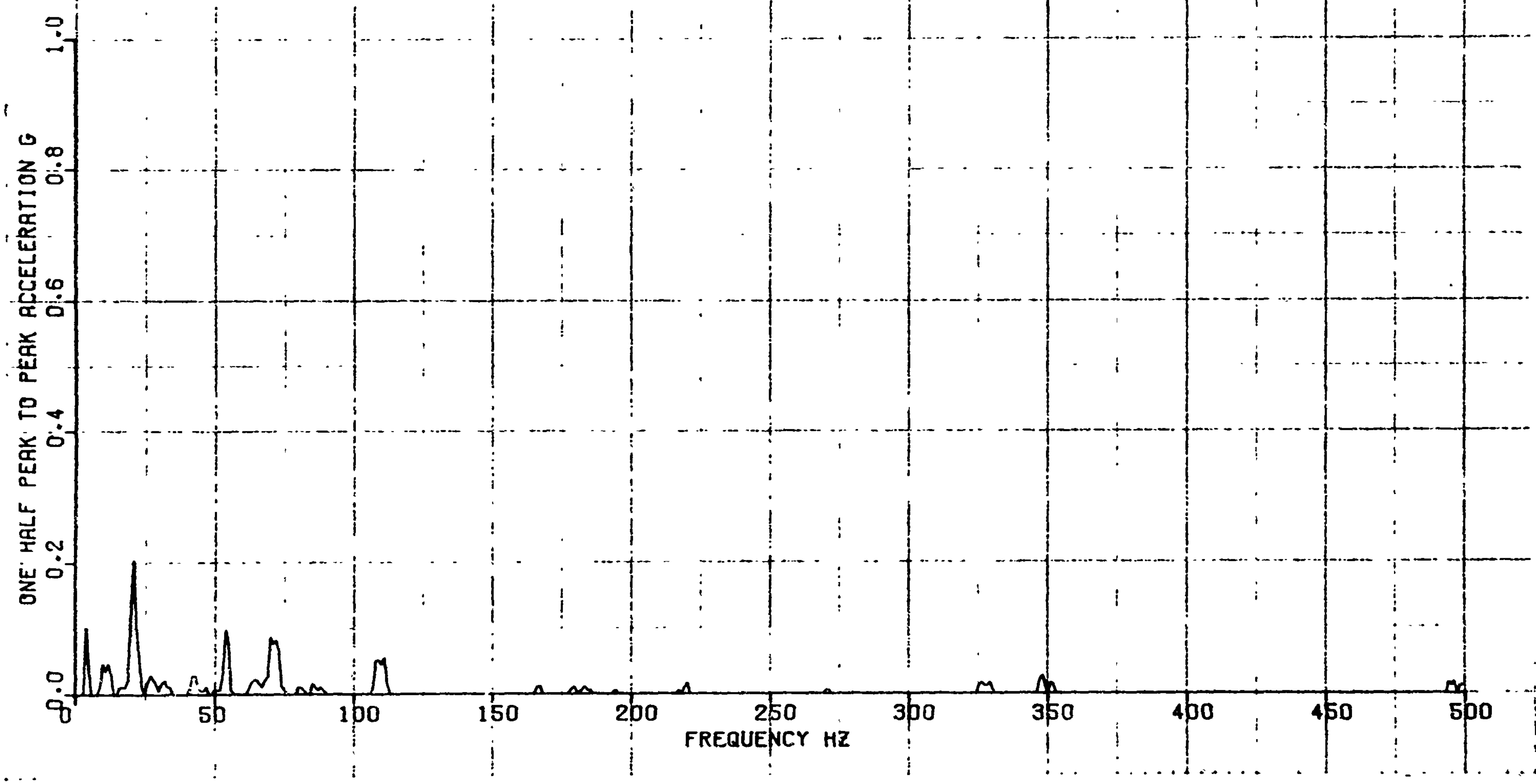


FIG 125

COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15804

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-HOVER GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 029

SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

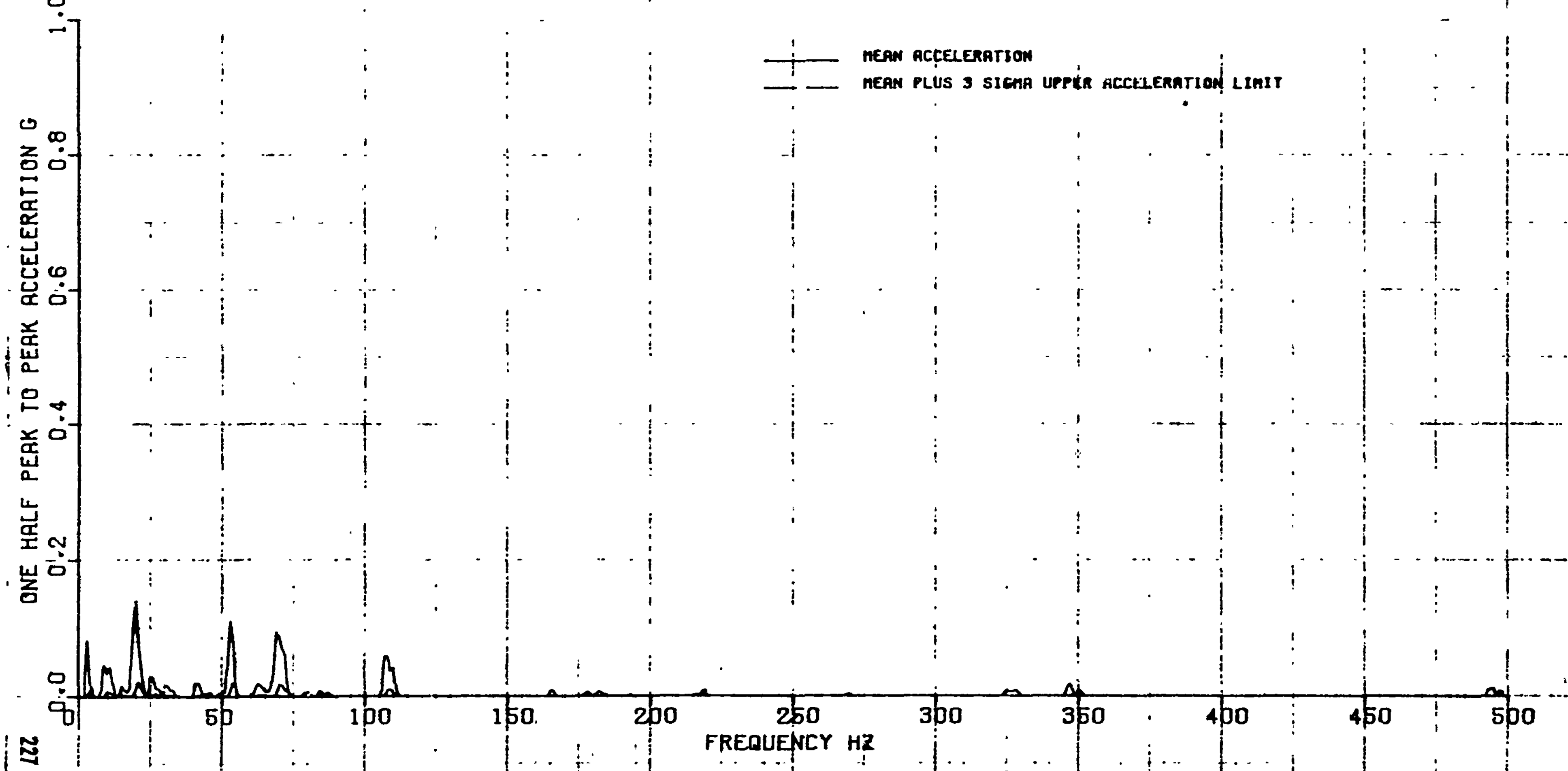


FIG 126

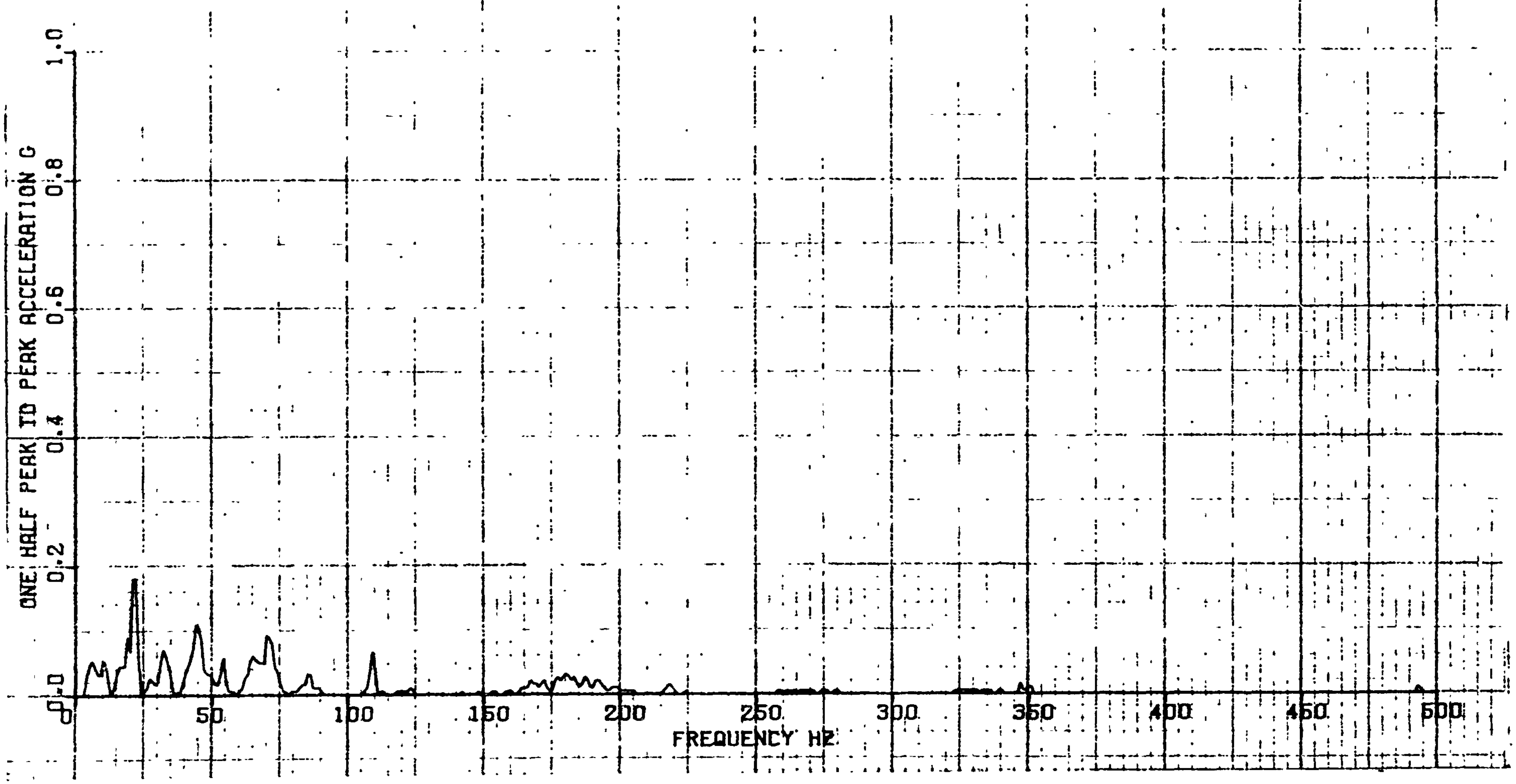
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-TRANS GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 030

SENSOR LOC 9.11.13 COMPRESSION PASS NO.1



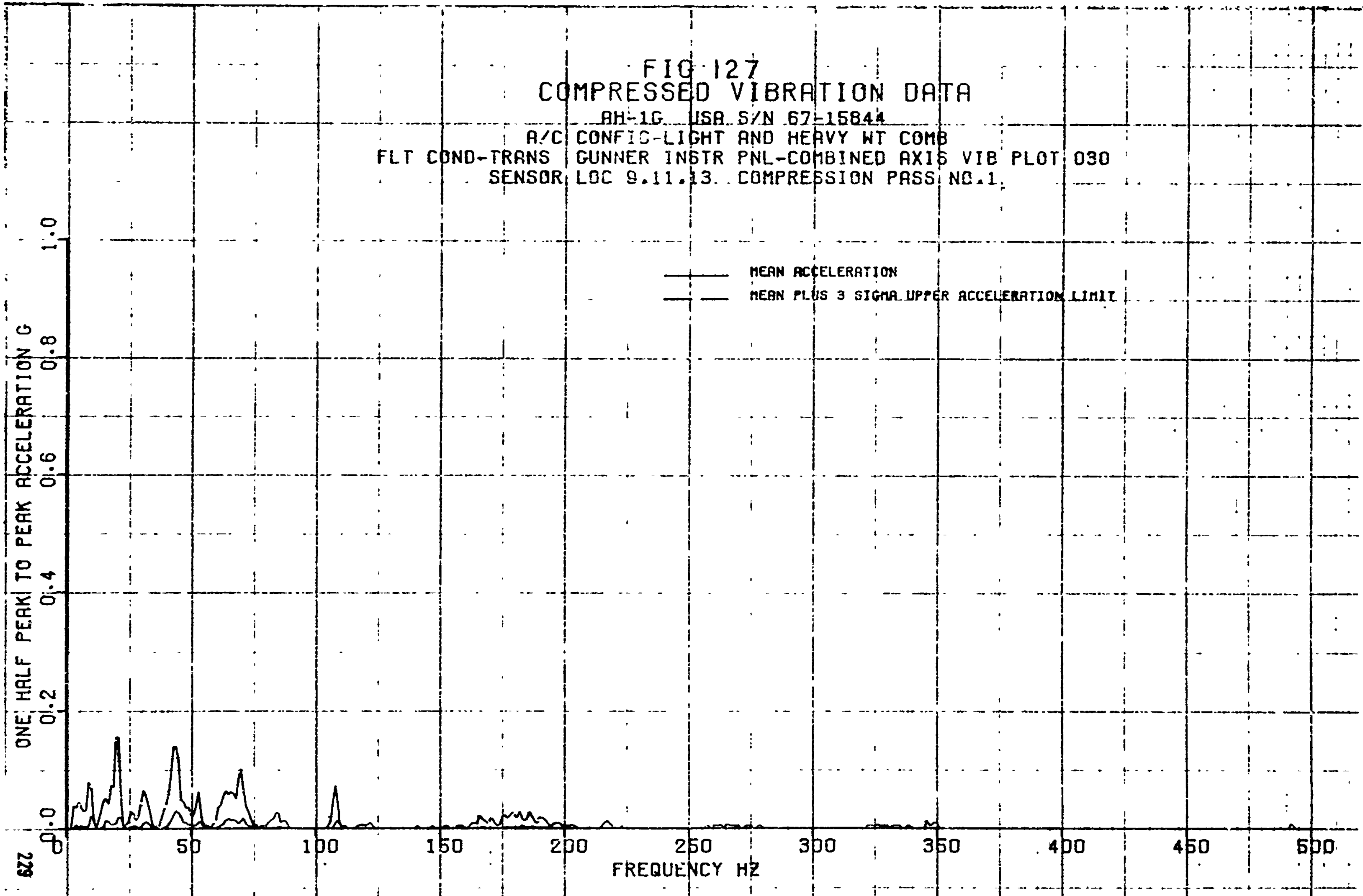


FIG 127
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TRANS GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 030
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 128
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LEVEL FLT GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 031
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

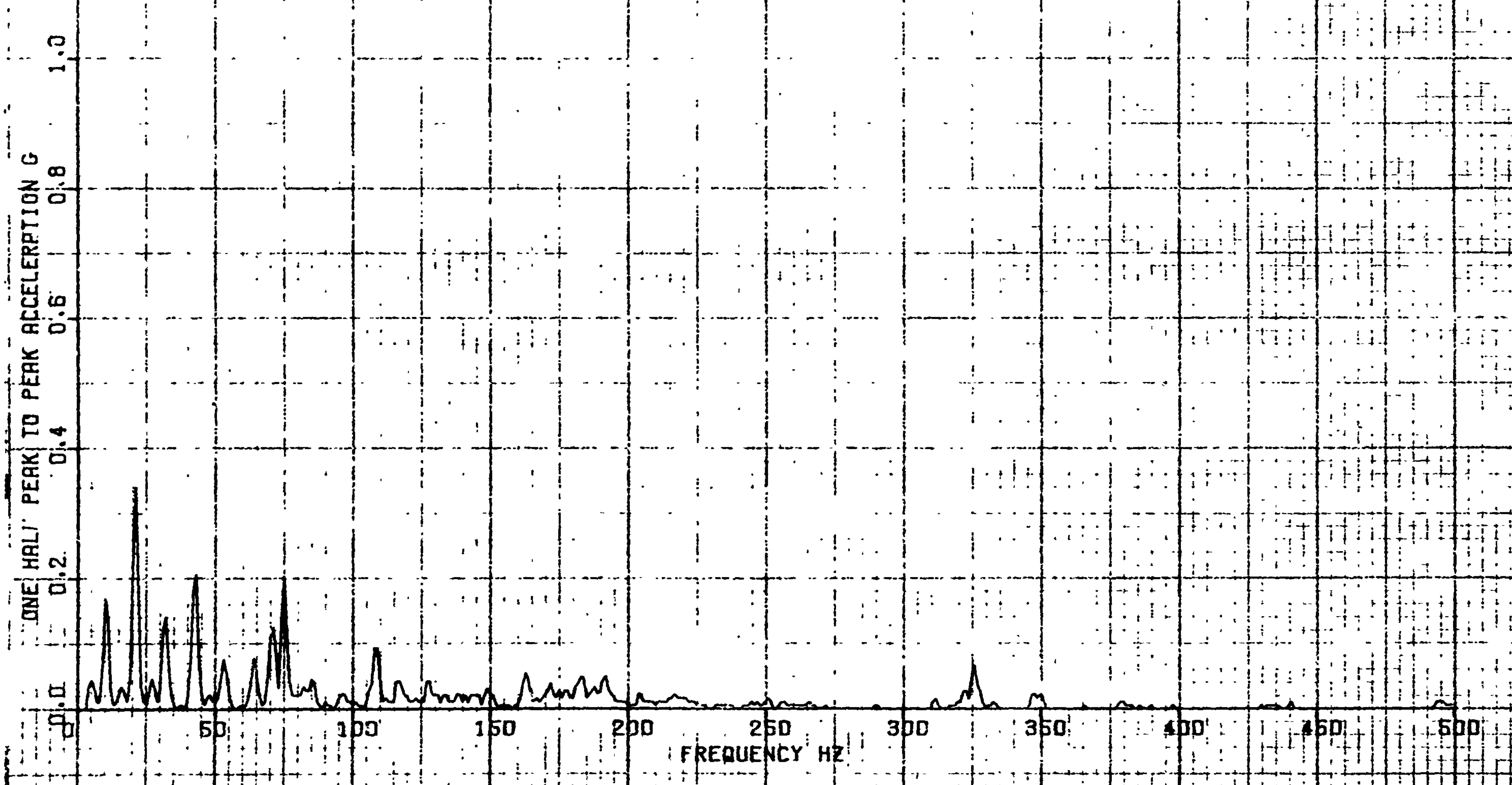


FIG 129
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LEVEL FLT GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 031
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

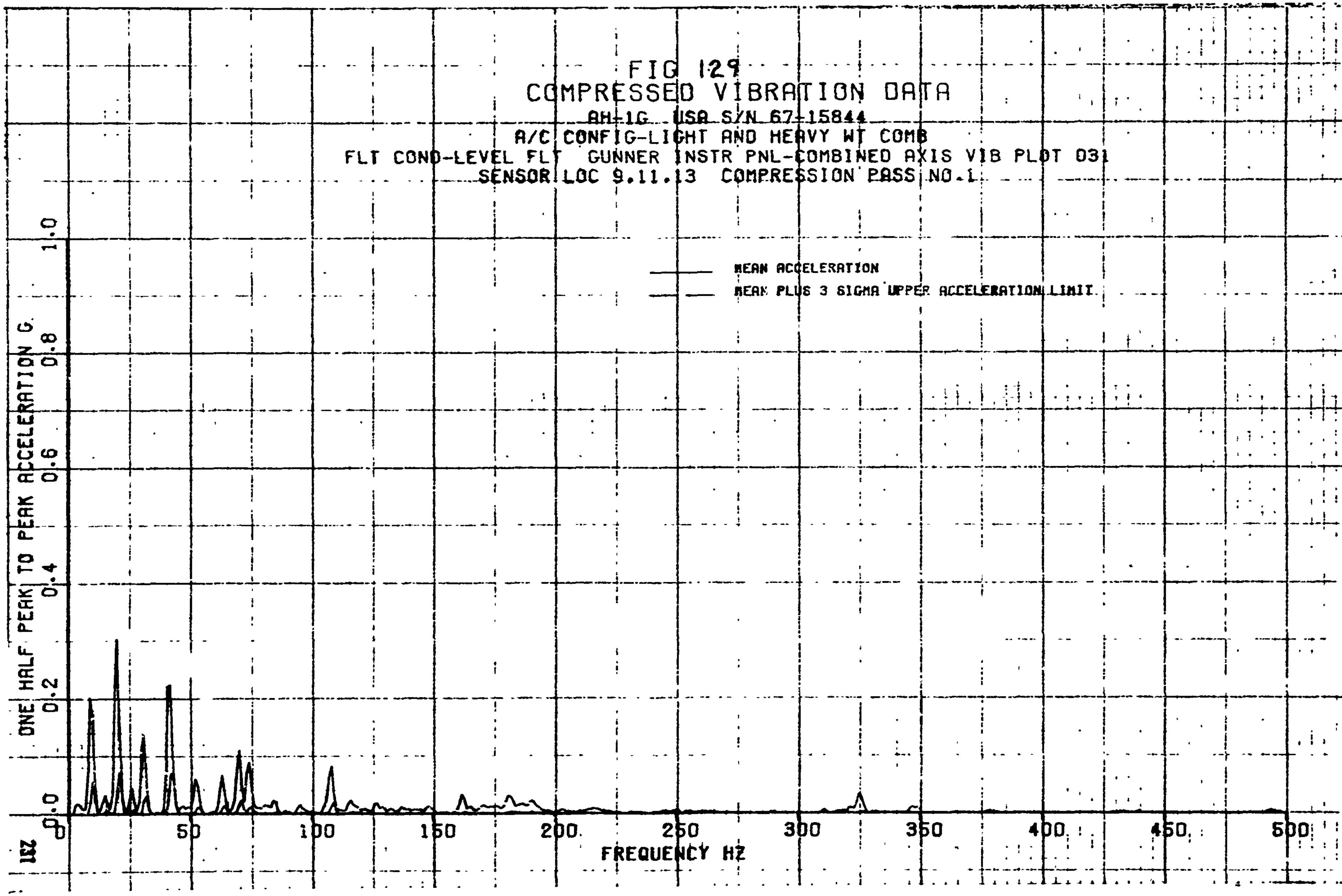
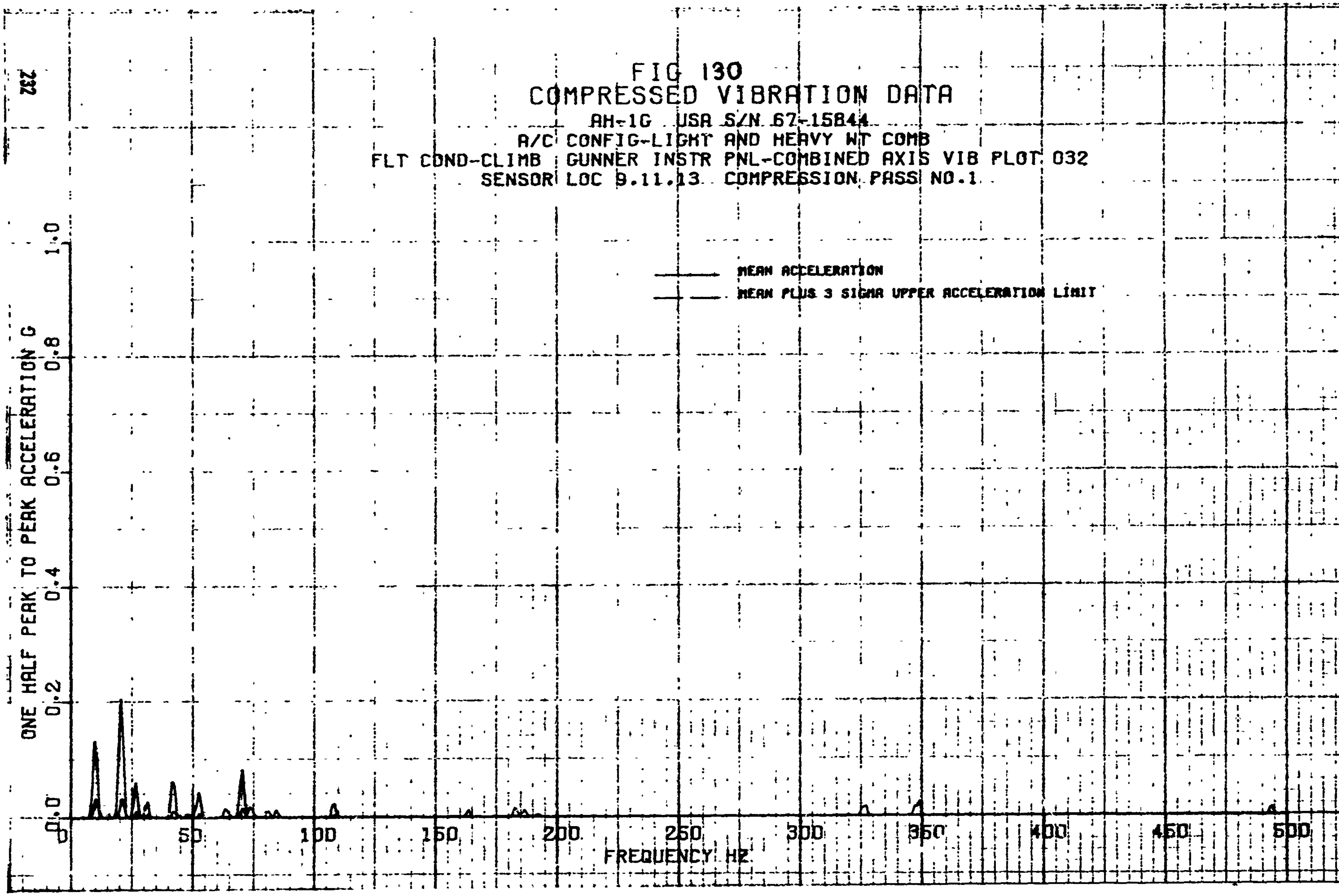


FIG 130
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-CLIMB GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 032
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1



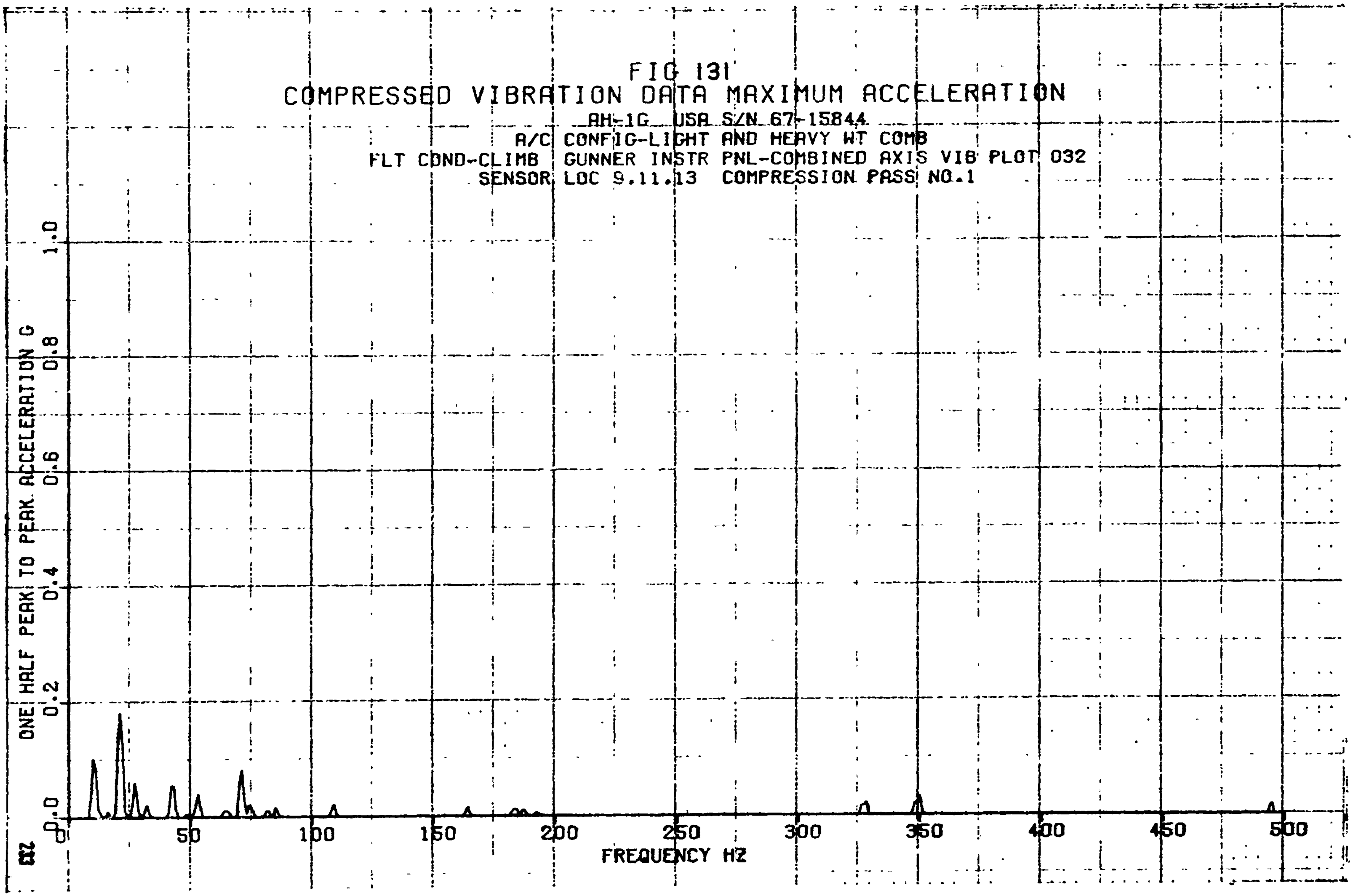
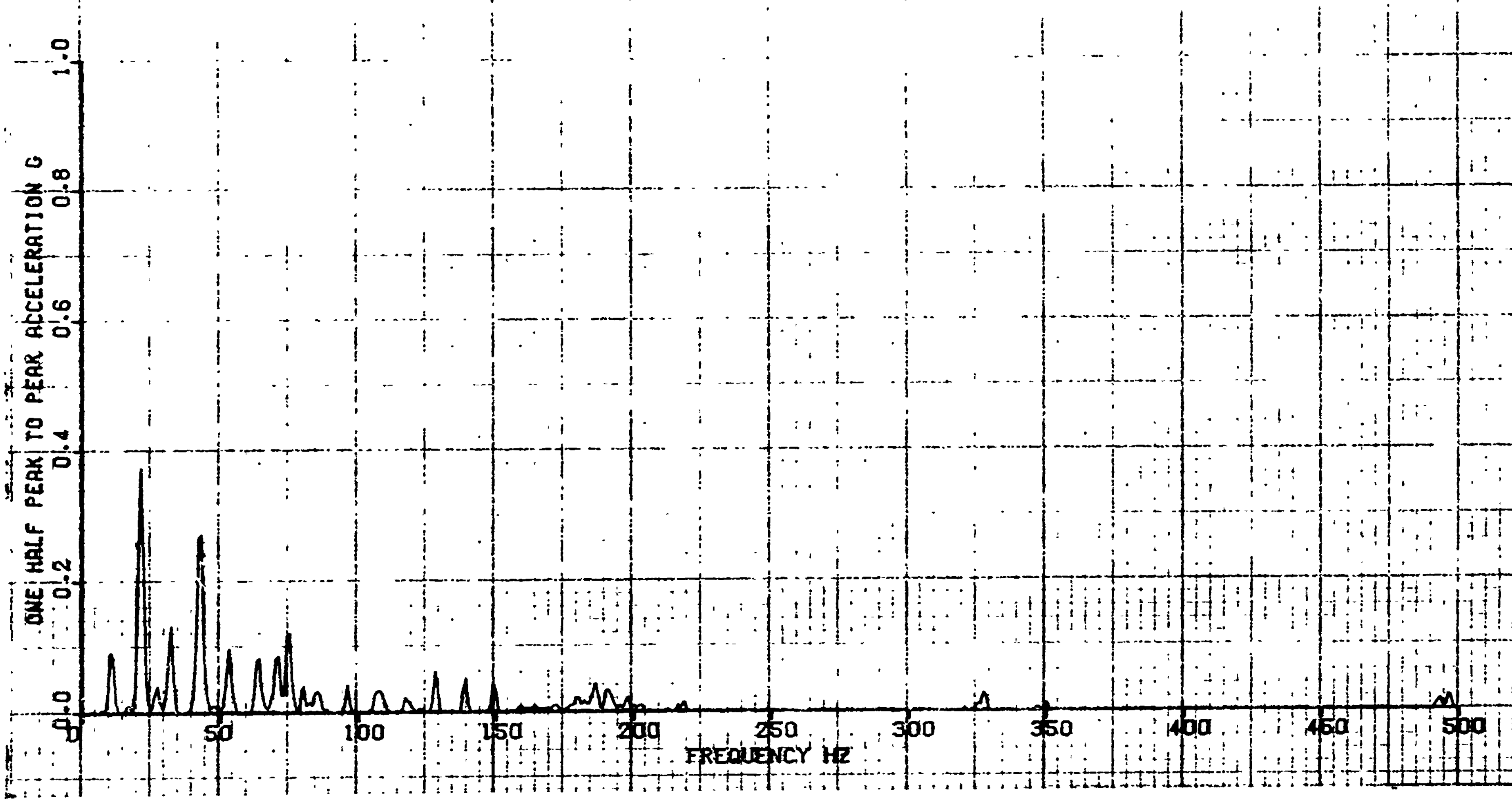


FIG 131
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-CLIMB GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 032
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

FIG 132
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-DESCENT GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 033
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1



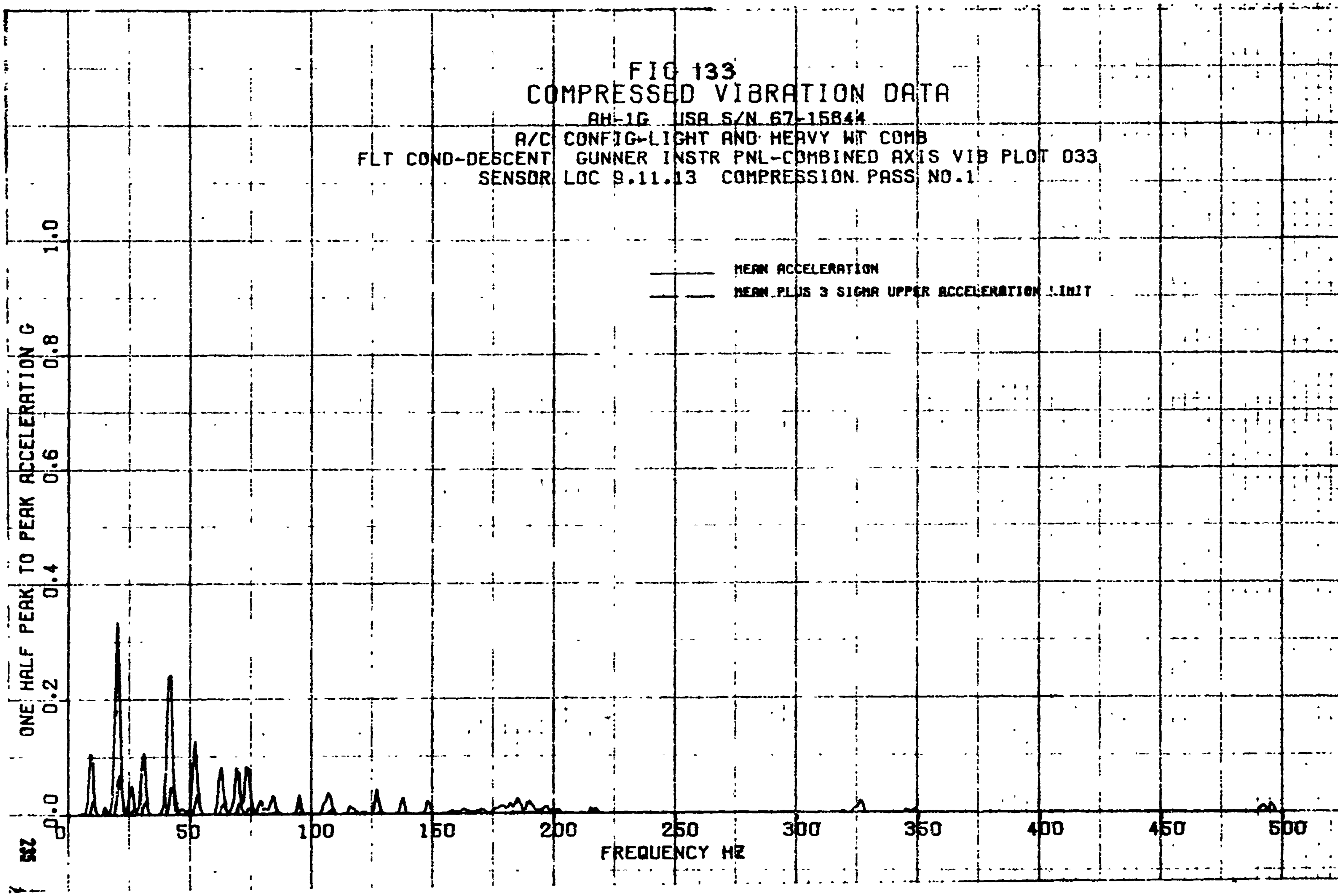


FIG 133
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-DESCENT GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 033
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

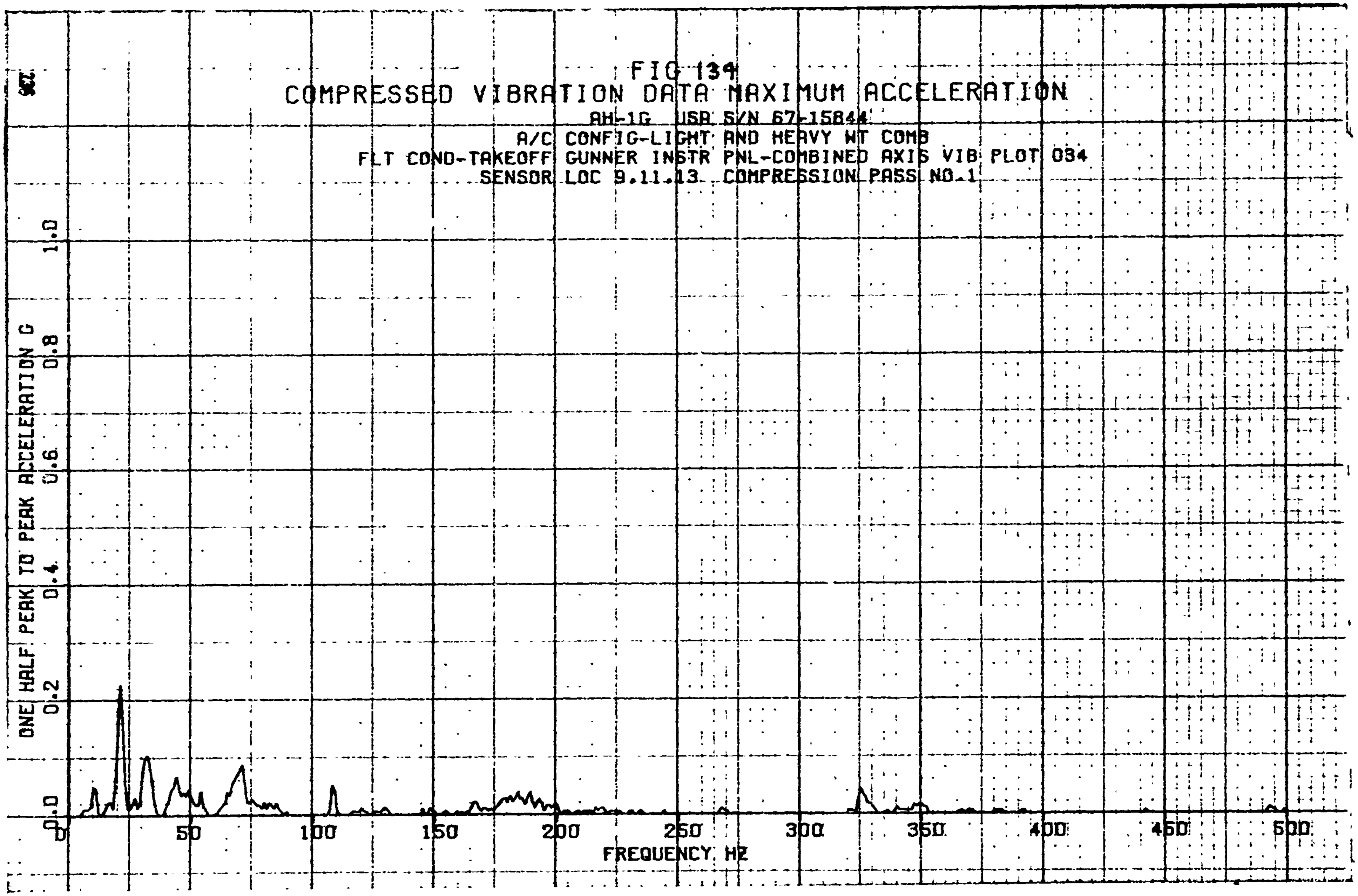


FIG 134
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TAKEOFF GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 034
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

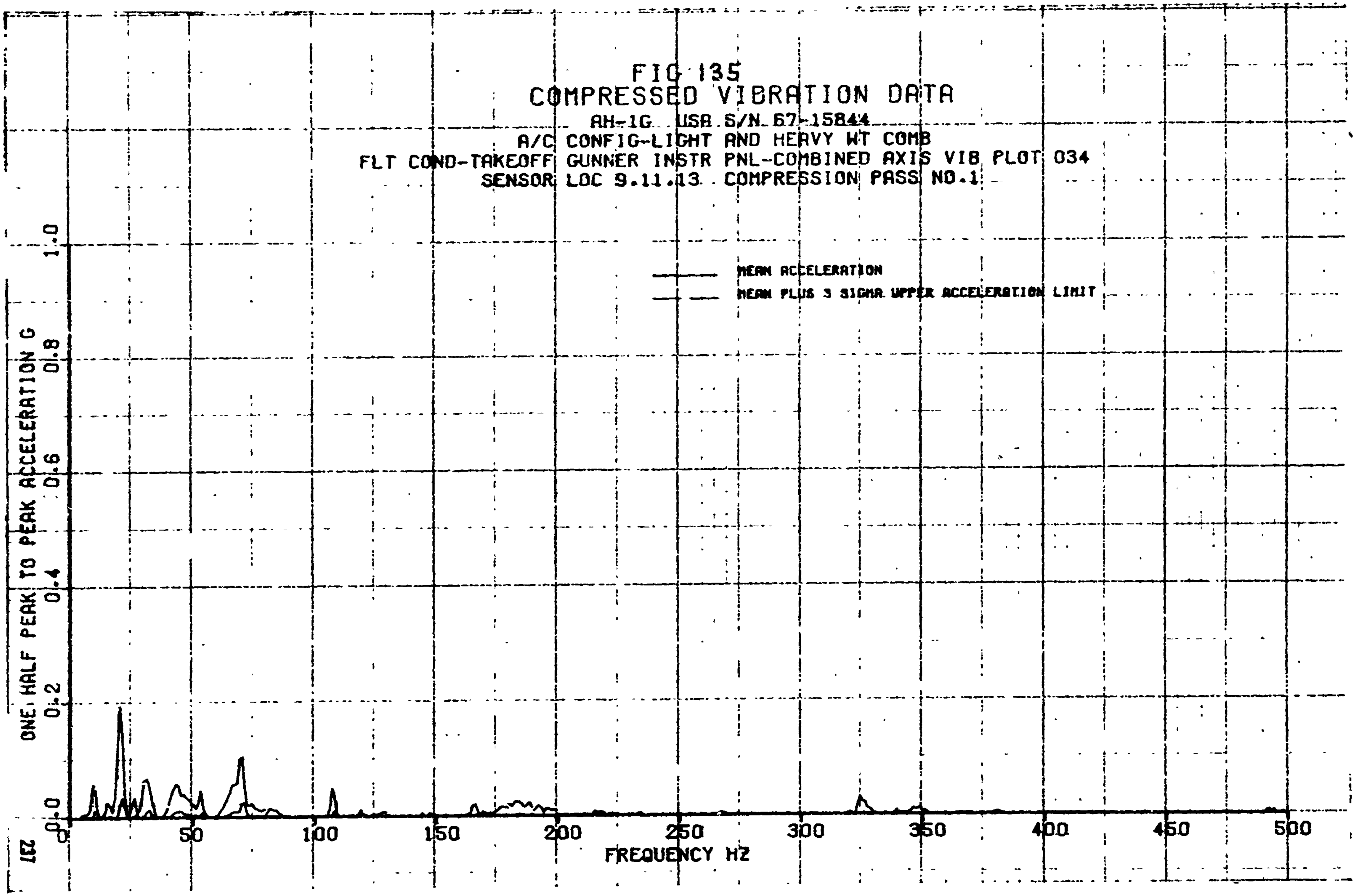


FIG 135
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TAKEOFF GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 034
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

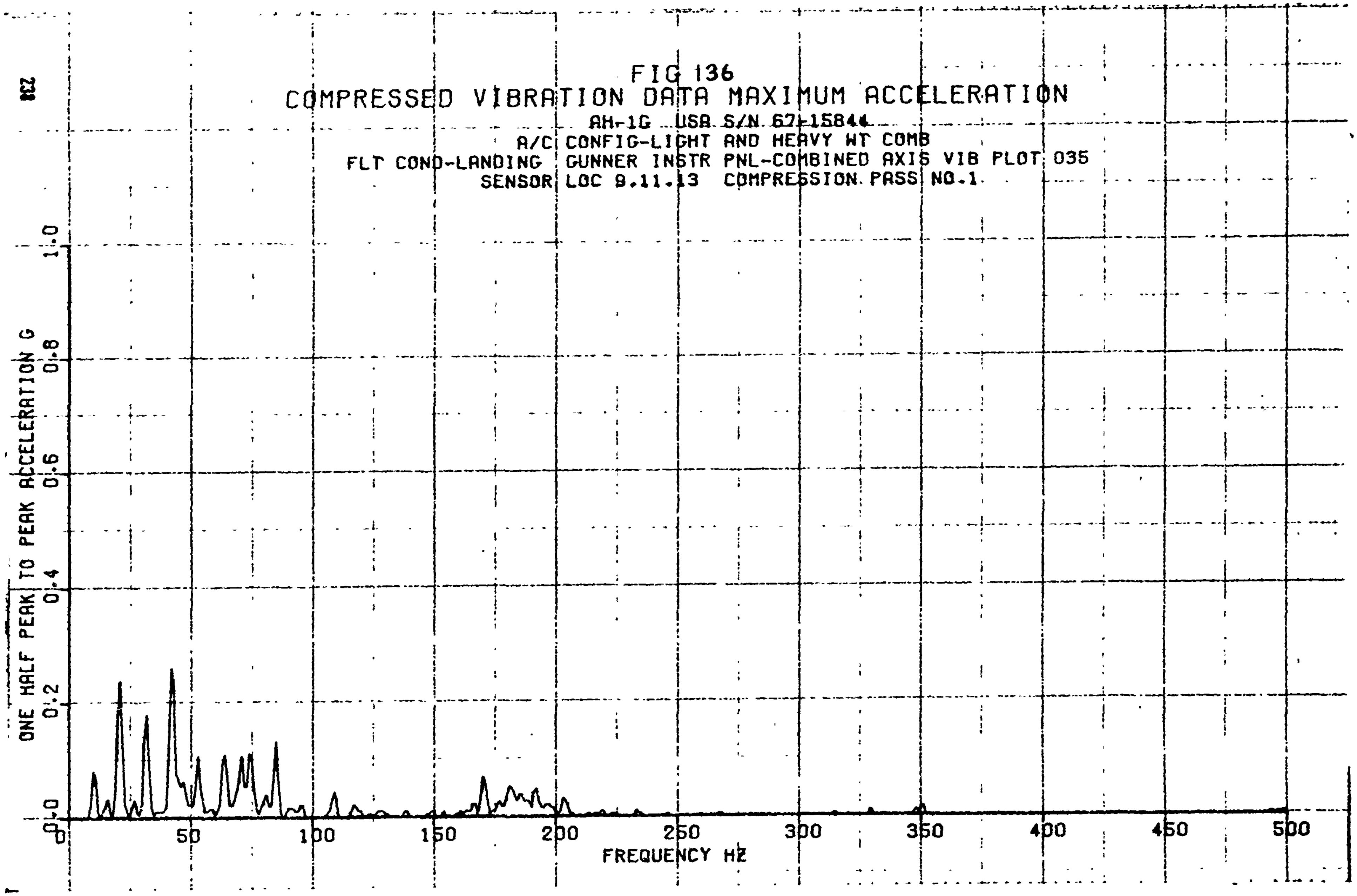


FIG 136
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LANDING GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 035
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

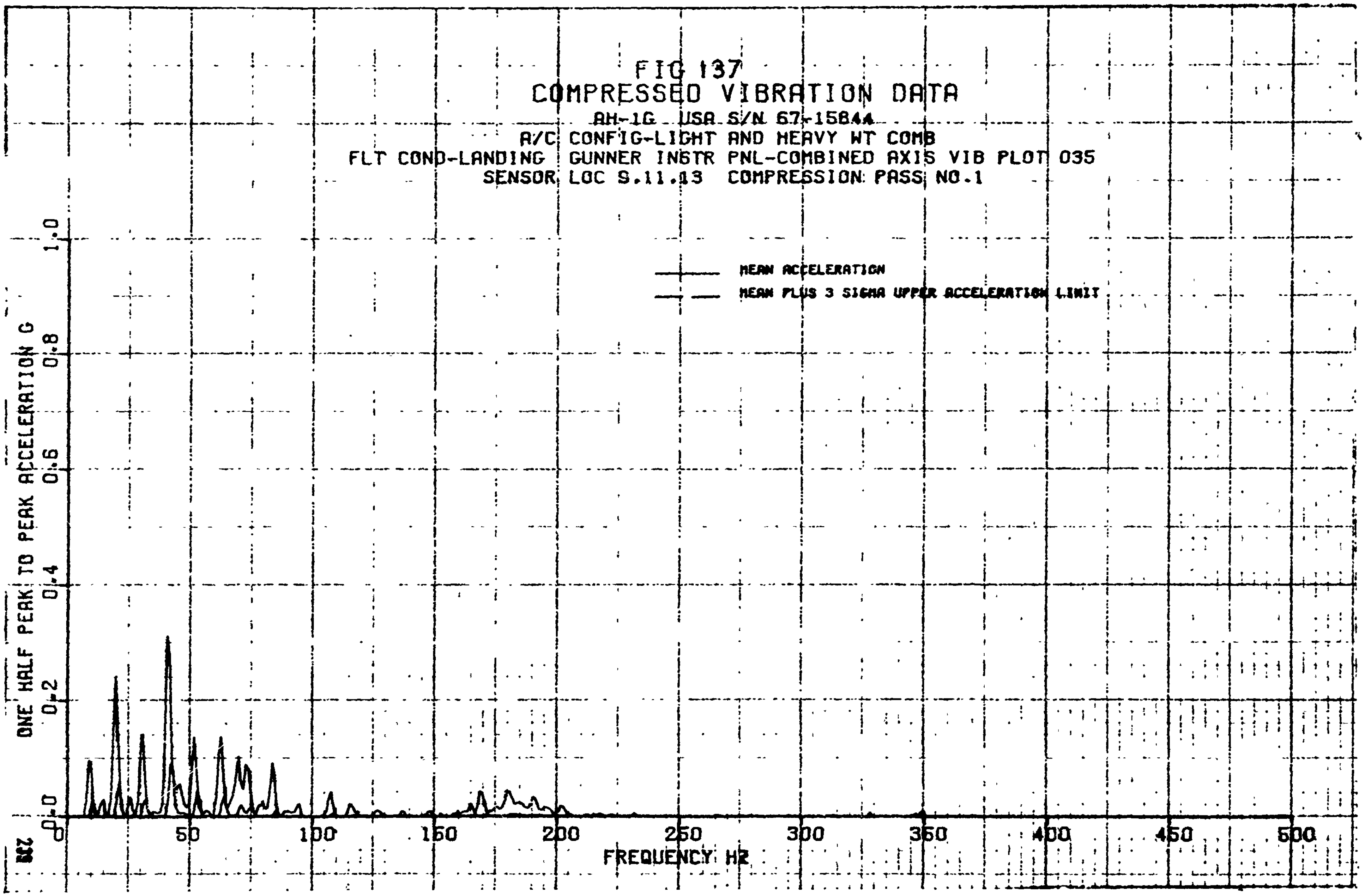


FIG 137
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LANDING GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 035
SENSOR LOC S.11.13 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 138

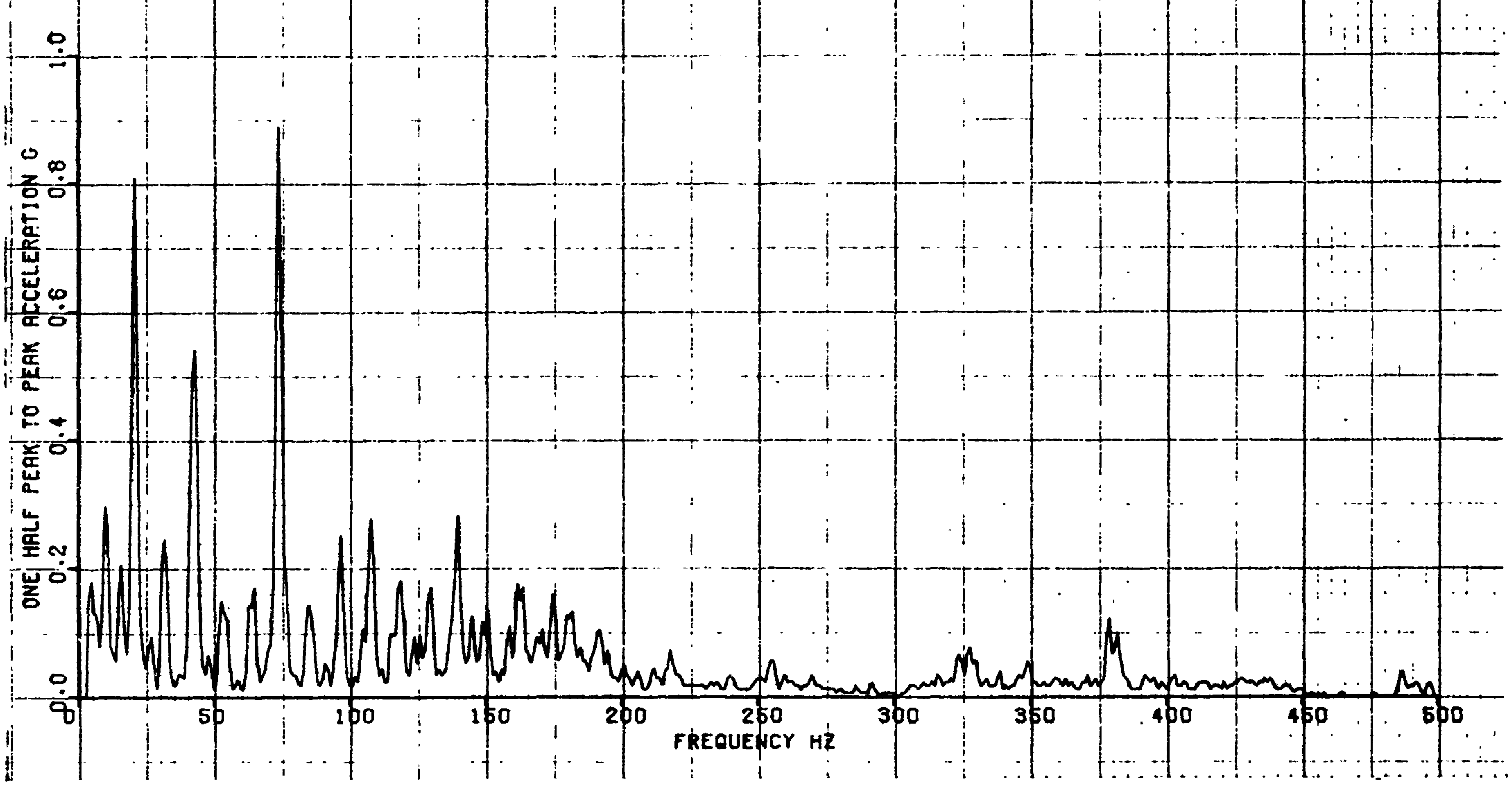
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-MANEUVERING GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 036

SENSOR LOC 9.11.13 COMPRESSION PASS NO.1



240

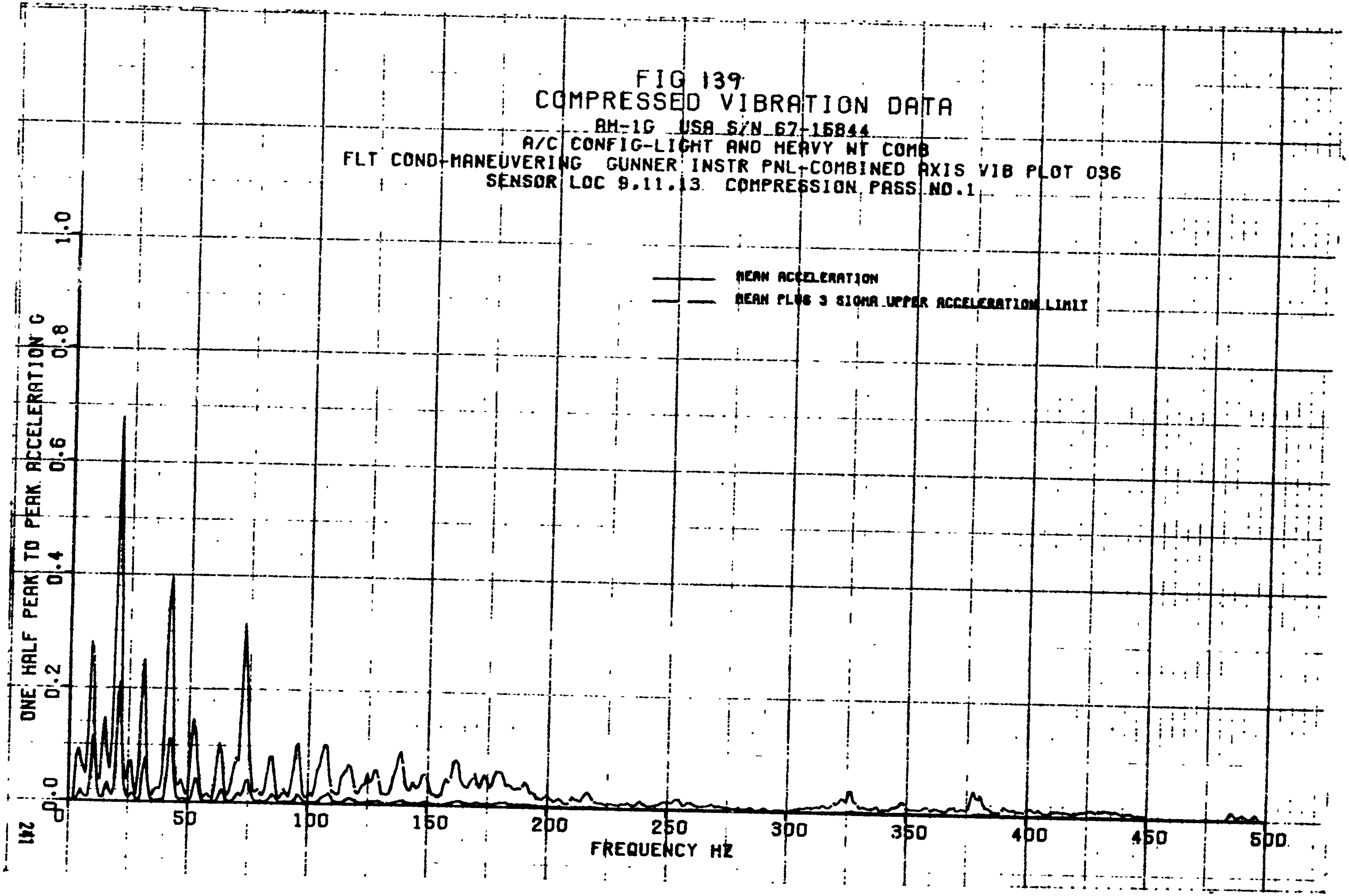


FIG 139
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-MANEUVERING GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 036
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

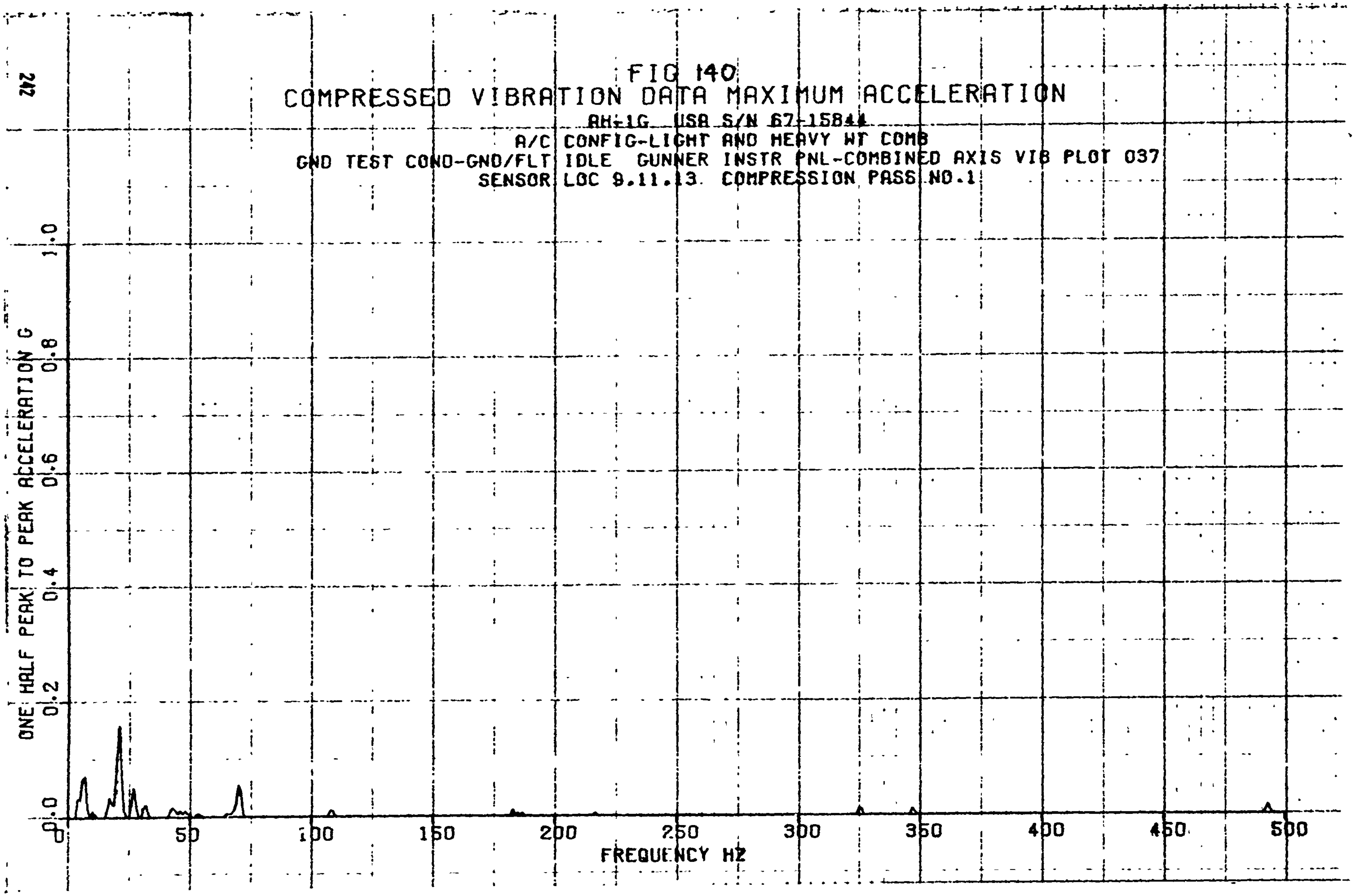


FIG 140
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
GND TEST COND-GND/FLT IDLE GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 037
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

FIG 141
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
GND TEST COND-GND/FLT IDLE GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 037
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

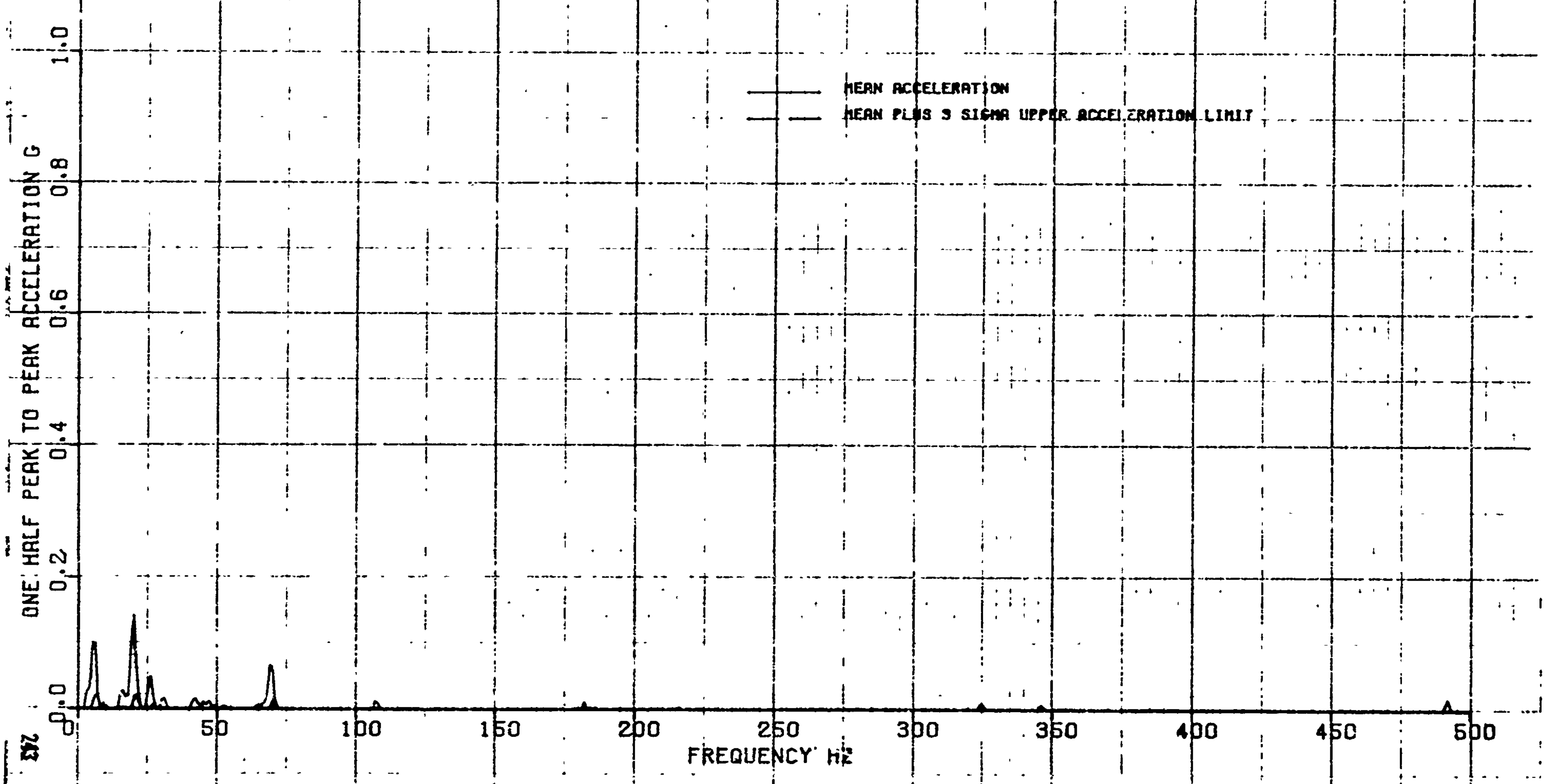


FIG 142
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM134 7.62MM GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 038
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

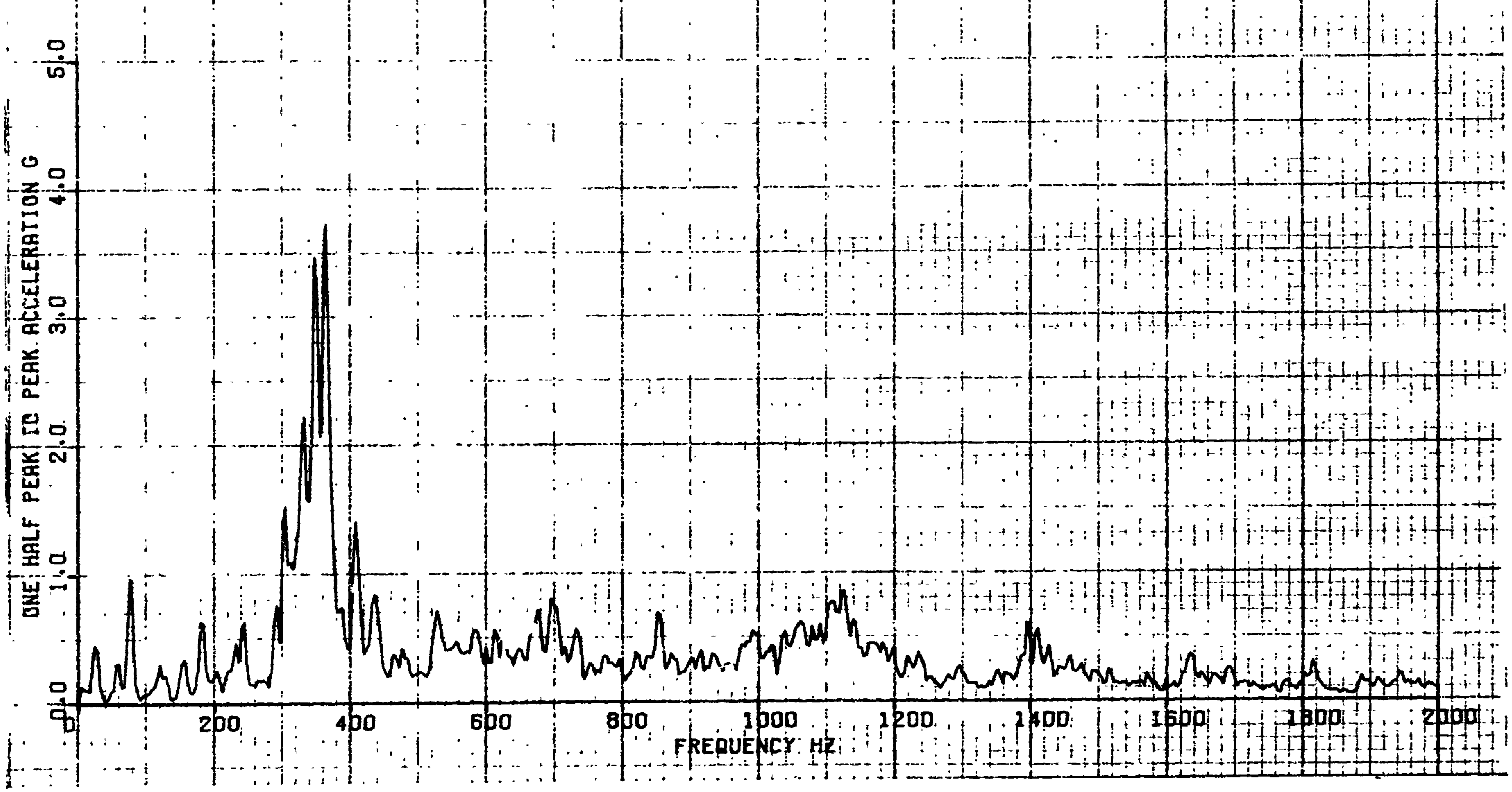
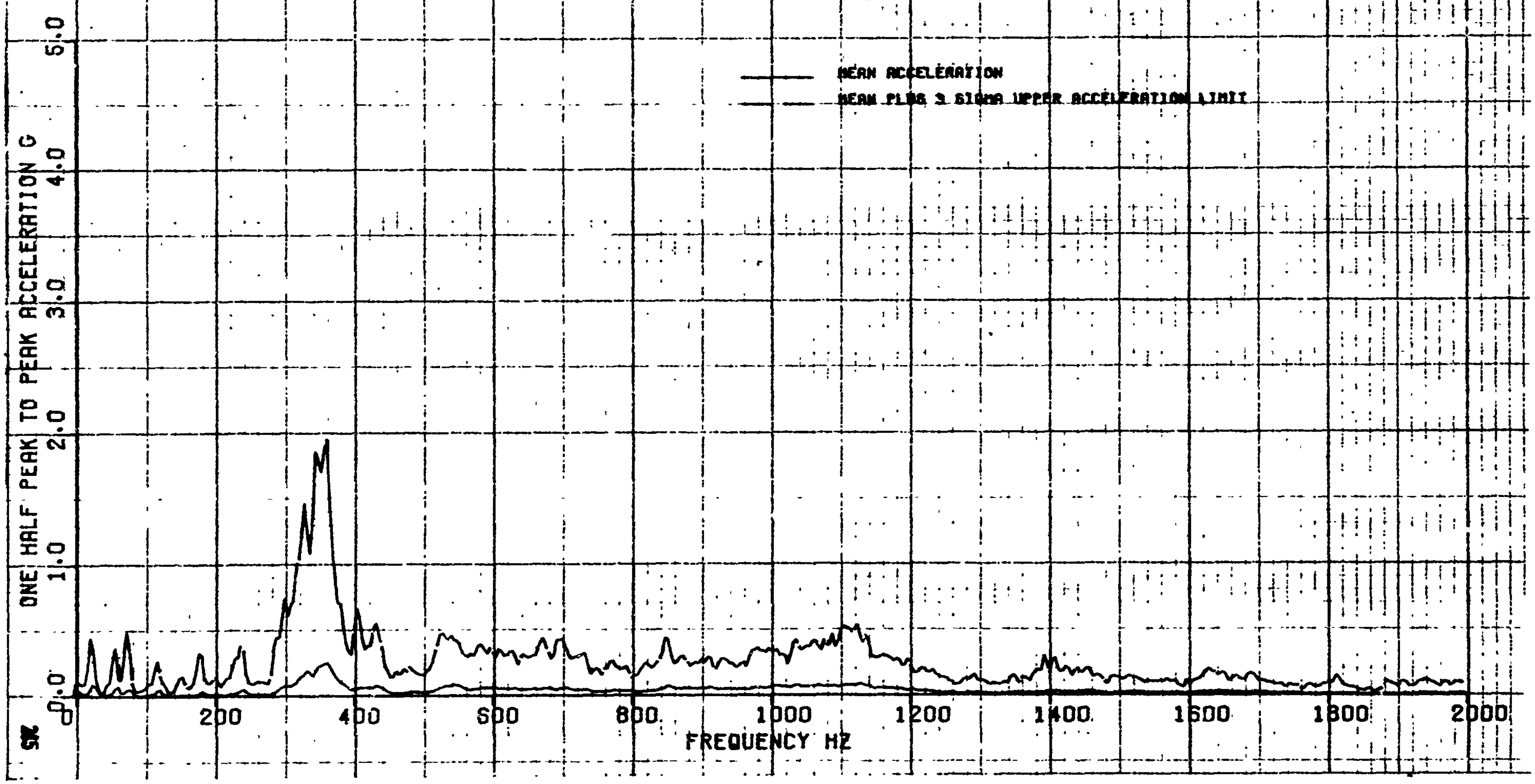


FIG 143
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM134 7.62MM GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 038
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1



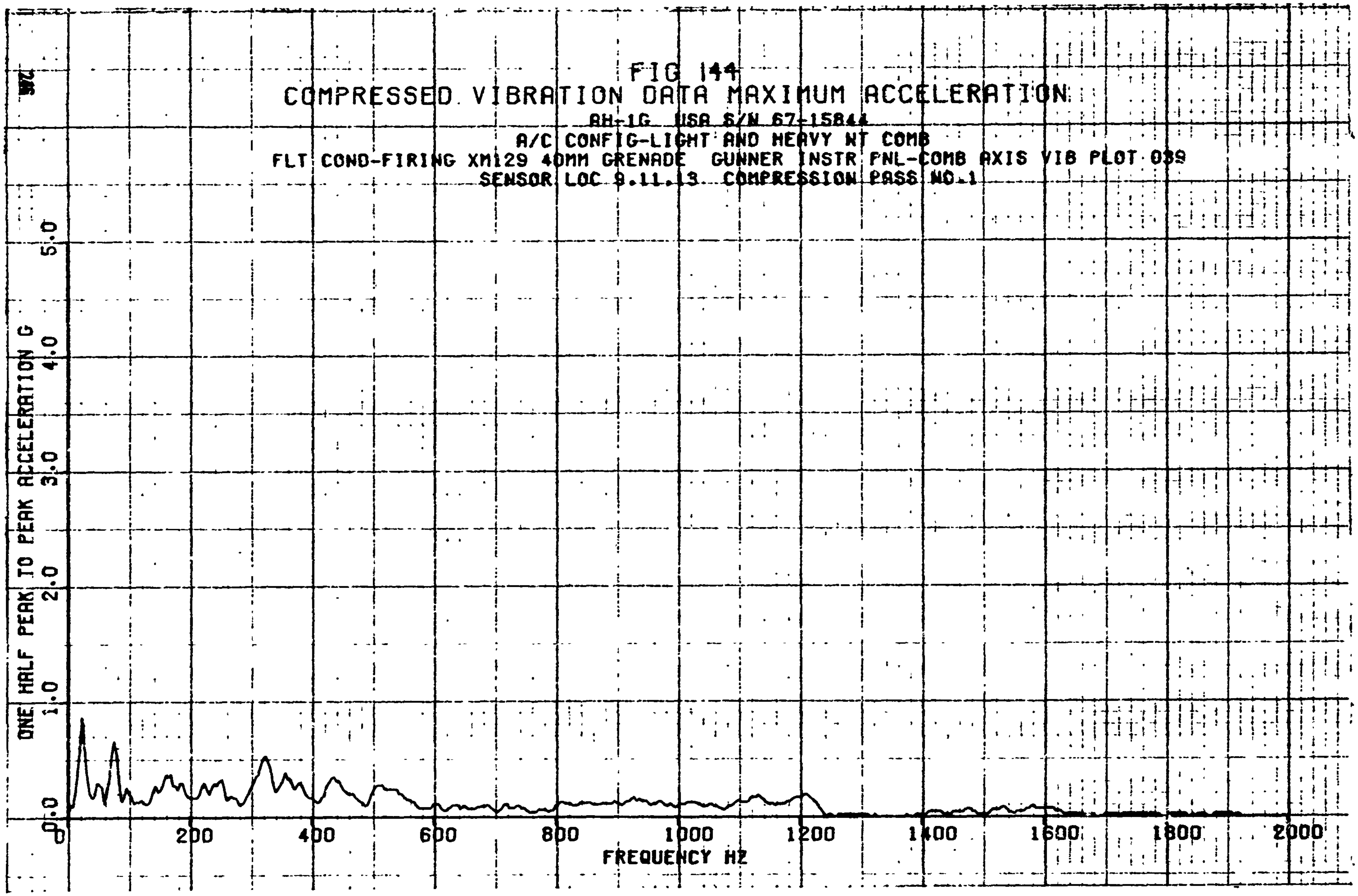


FIG 144
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM129 40MM GRENADE GUNNER INSTR PNL-COMB AXIS VIB PLOT 039
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

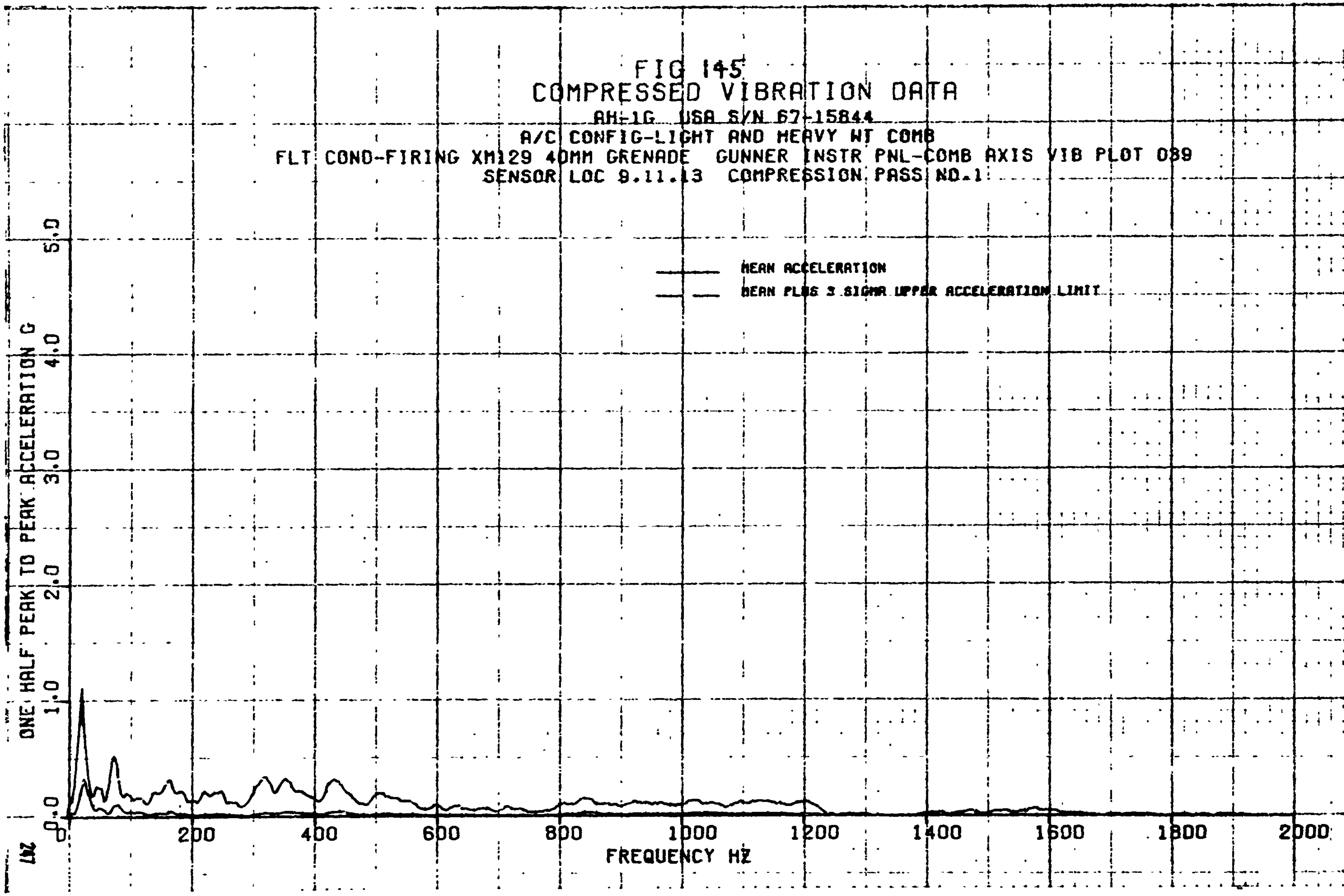
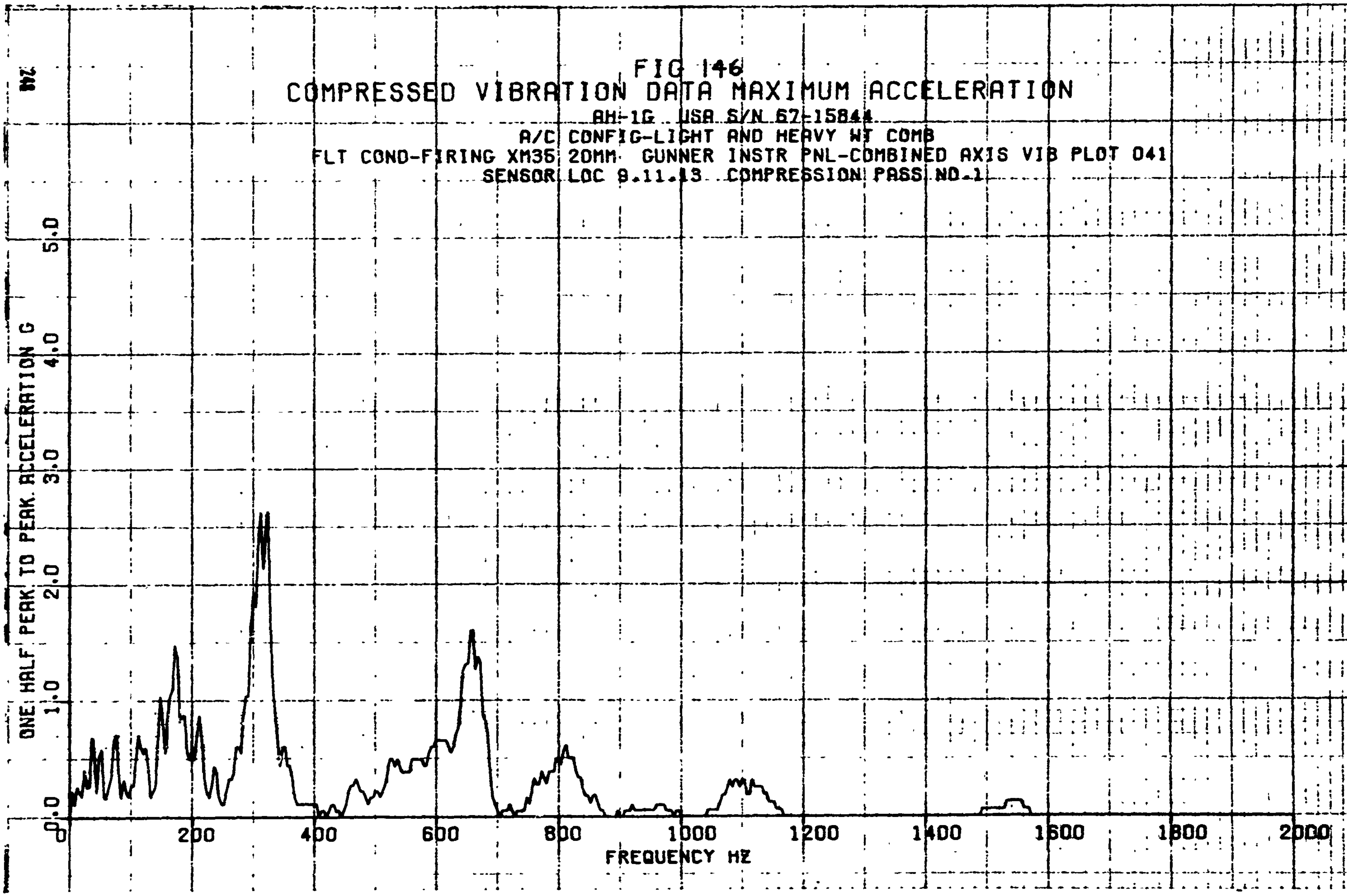


FIG 145
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM129 40MM GRENADE GUNNER INSTR PNL-COMB AXIS VIB PLOT 039
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 146
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM35 20MM GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 041
SENSOR LOC 9.11.13 COMPRESSION PASS NO-1



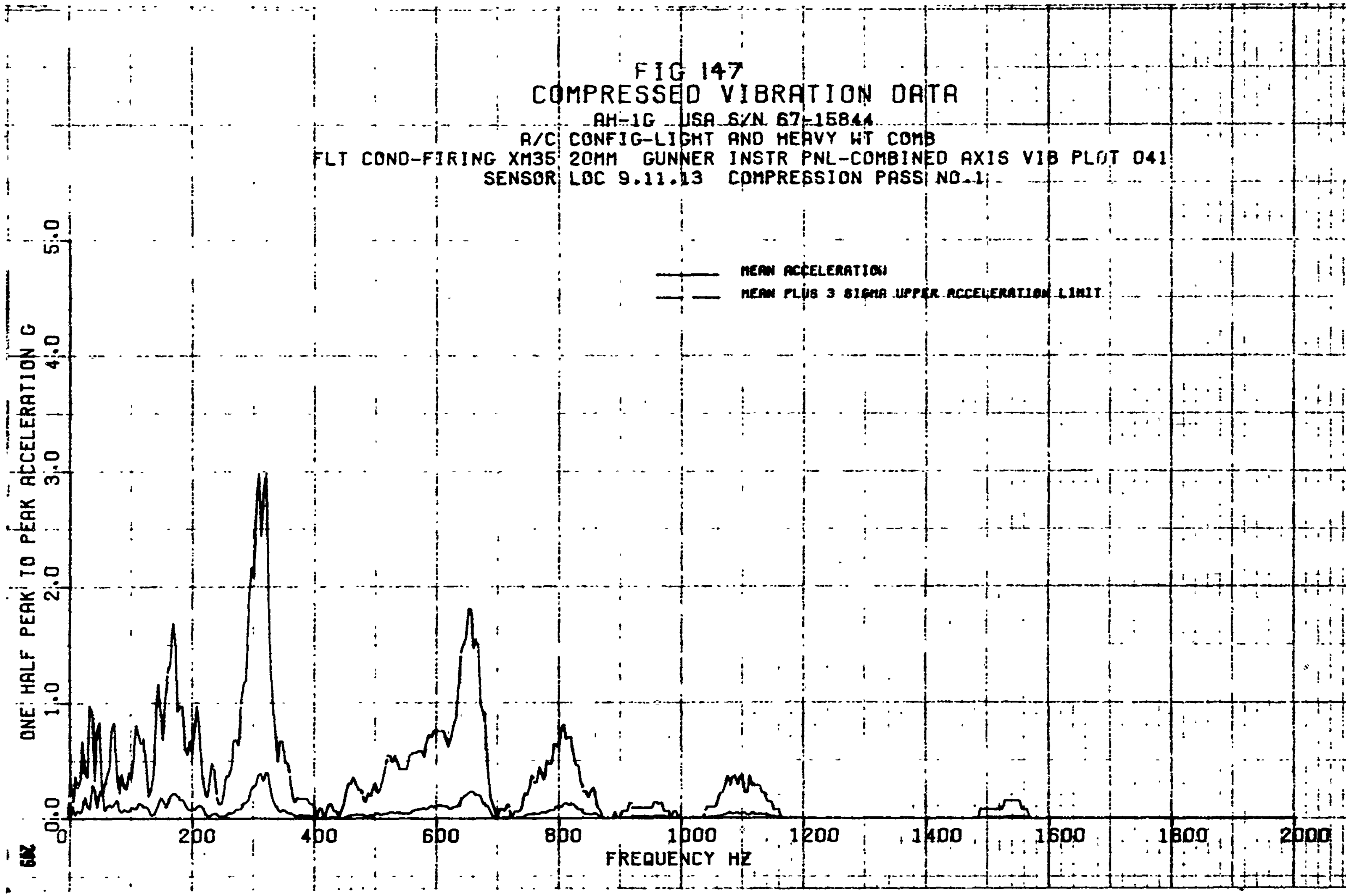


FIG 147
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM35 20MM GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 041
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 148

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-FIRING XM159 2.75FFAR GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 042

SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

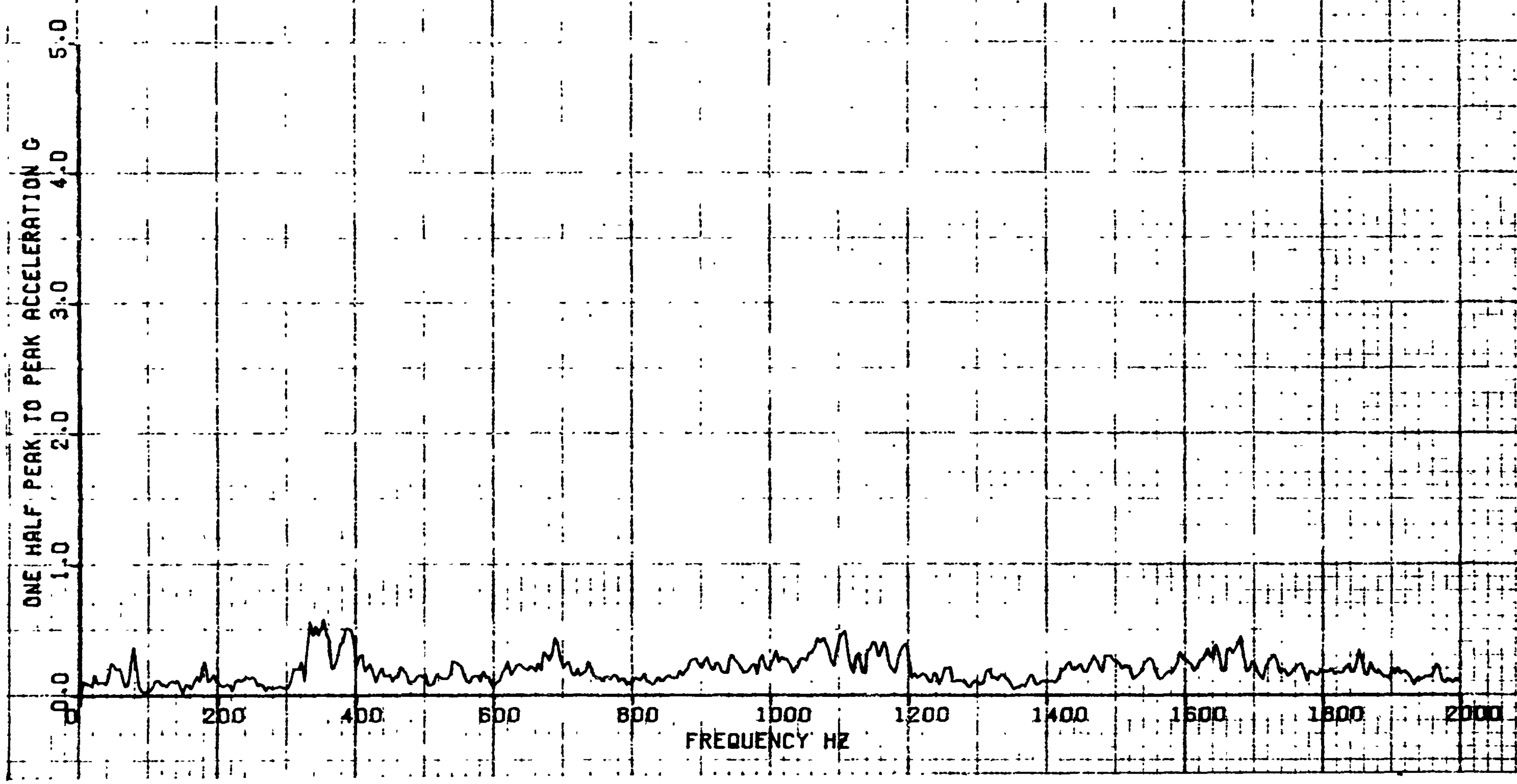


FIG 149
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM159 2.75FFAR GUNNER INSTR PNL-COMBINED AXIS VIB PLOT 042
SENSOR LOC 9.11.13 COMPRESSION PASS NO.1

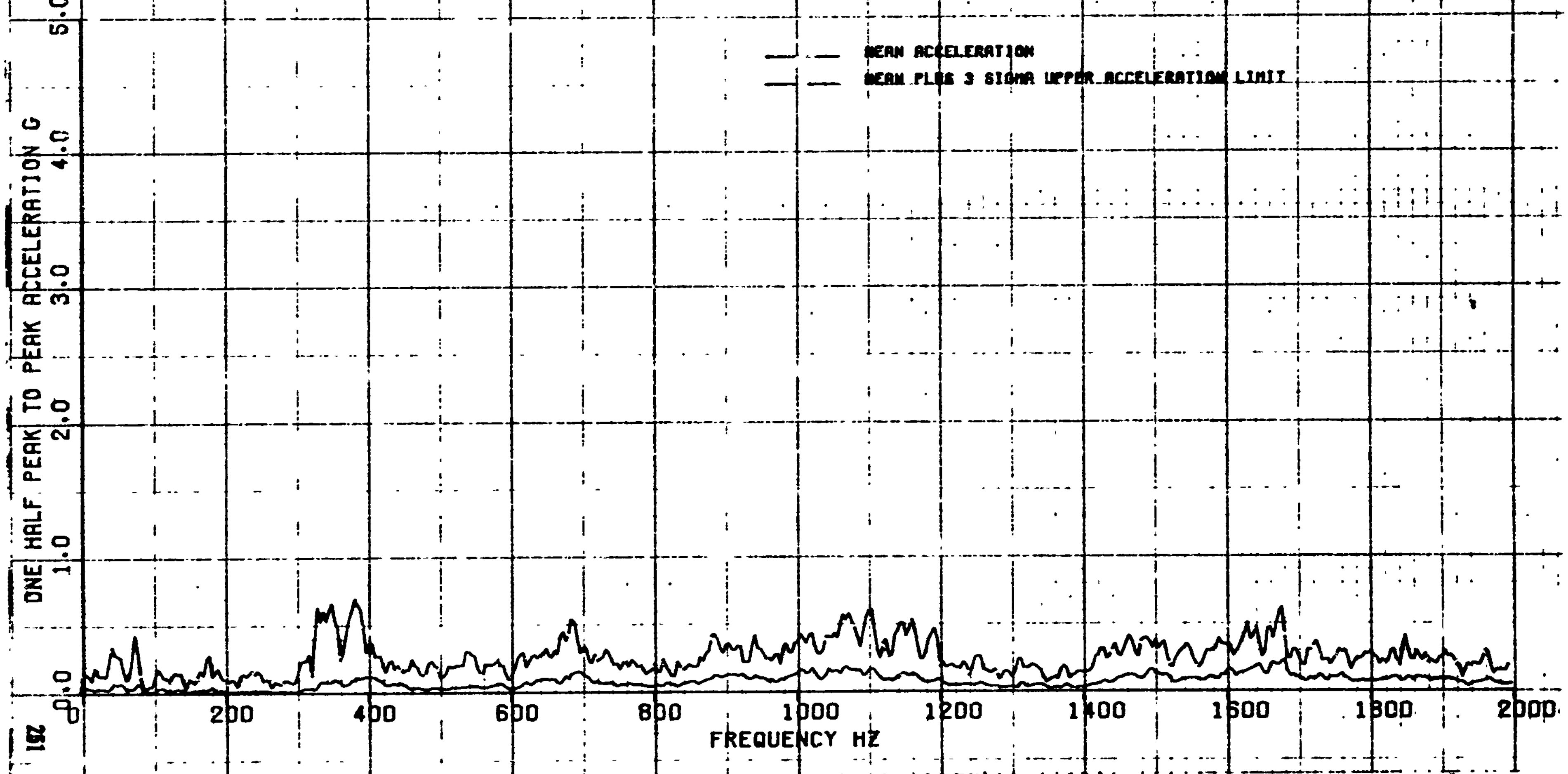


FIG 150

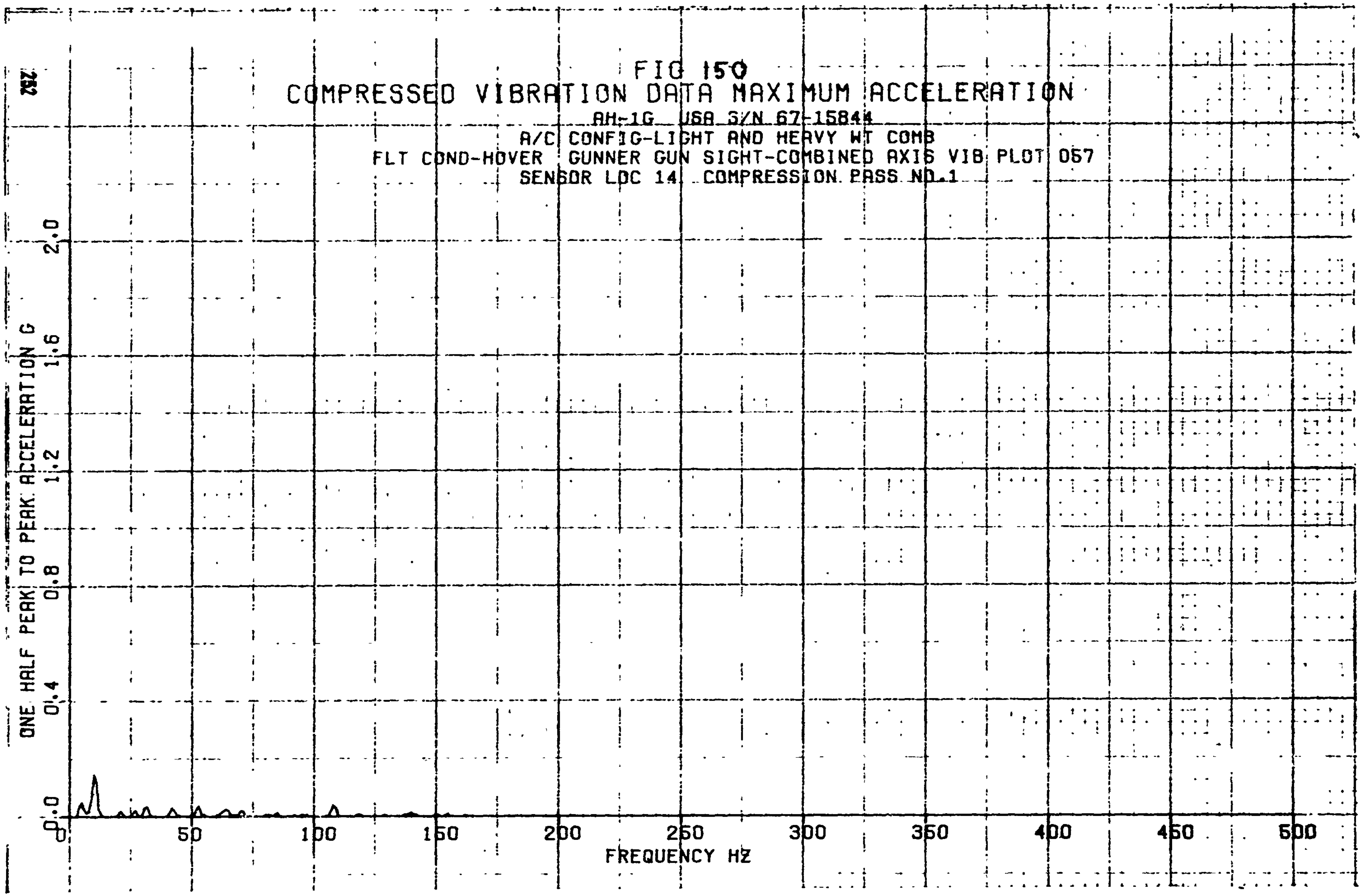
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-HOVER GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 057

SENSOR LOC 14 COMPRESSION PASS NO.1



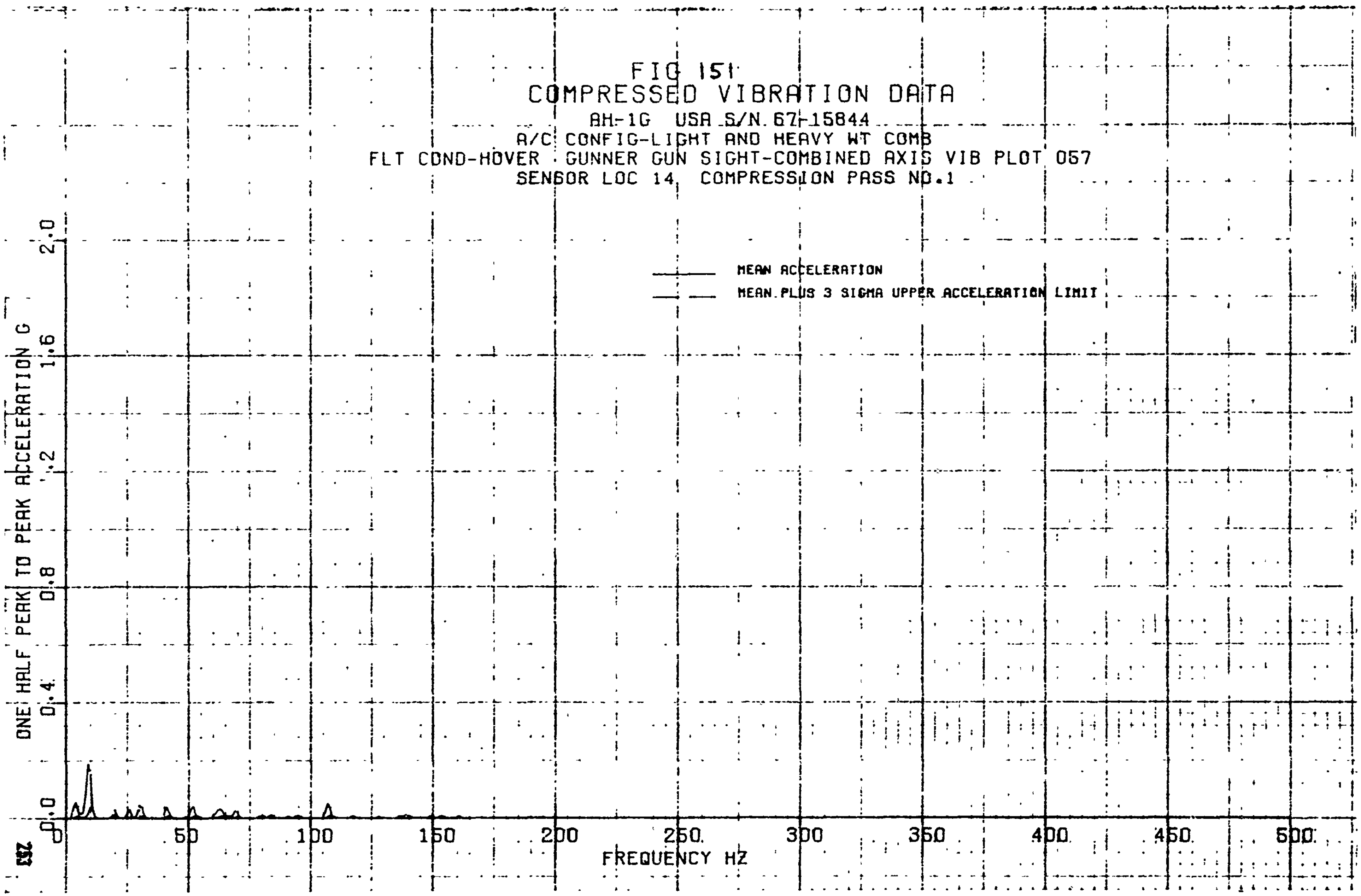
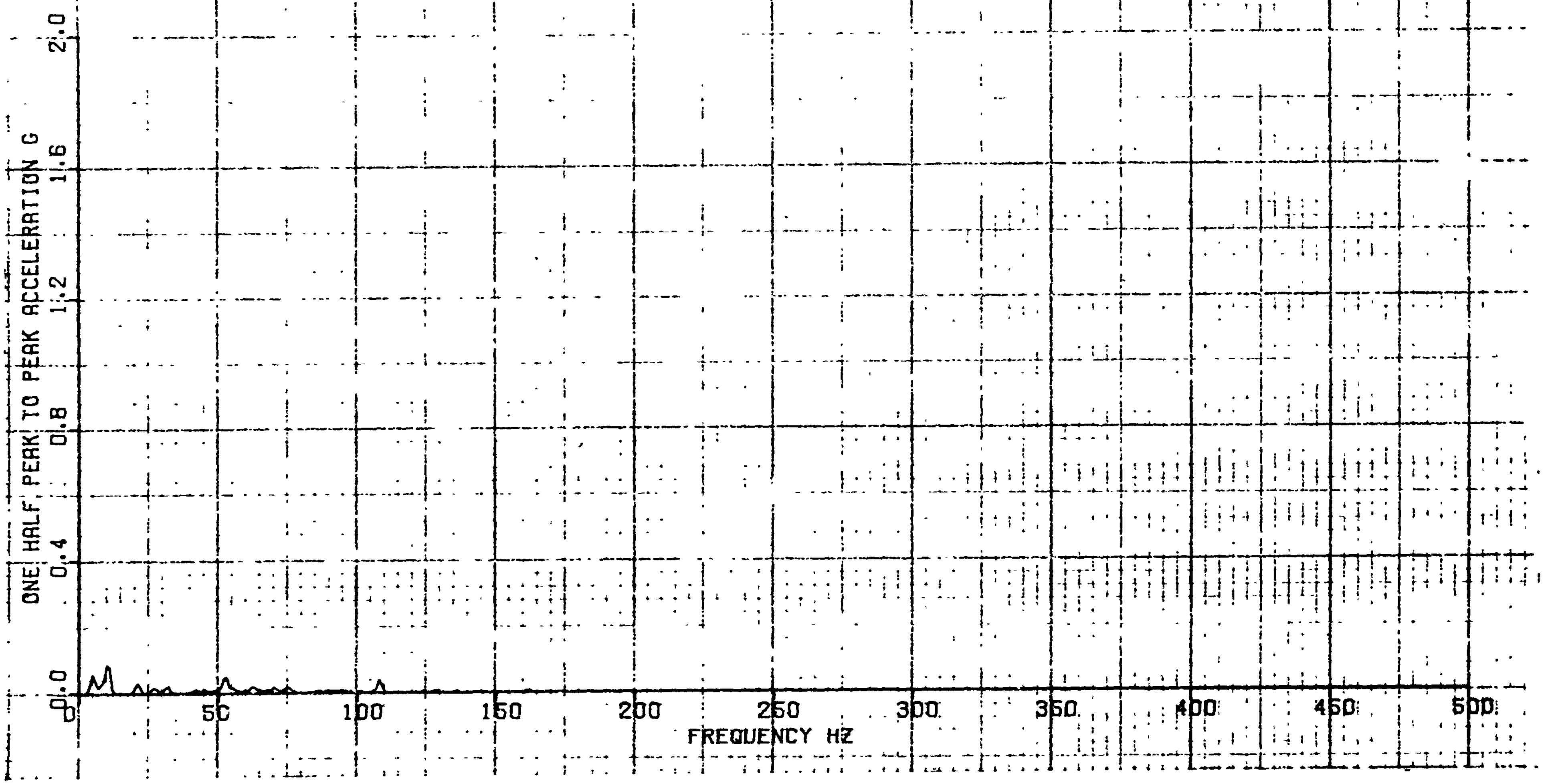


FIG 151
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-HOVER GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 057
SENSOR LOC 14 COMPRESSION PASS NO.1

FIG 152
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TRANS GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 058
SENSOR LOC 14 COMPRESSION PASS NO.1



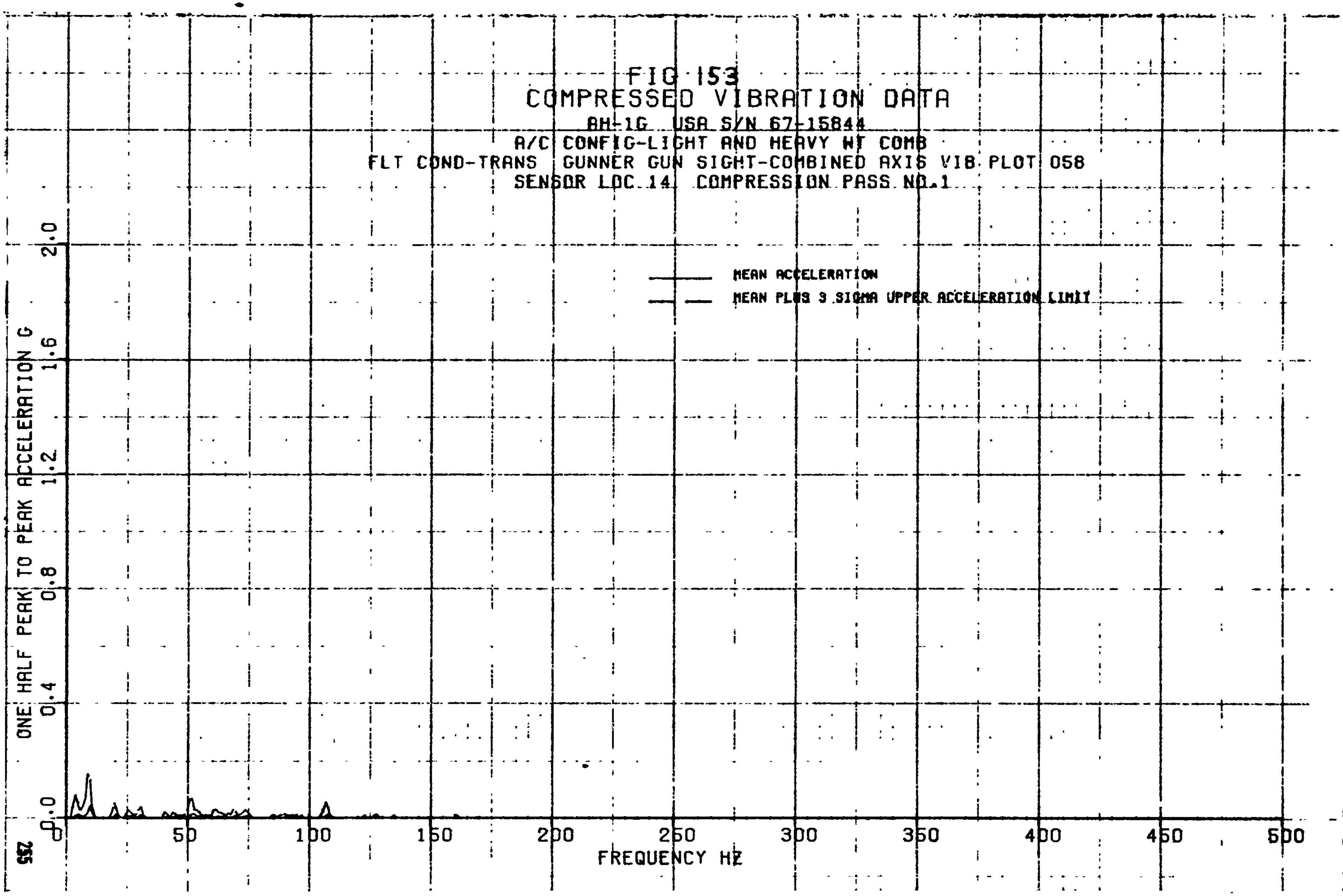


FIG 153
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TRANS GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 058
SENSOR LOC 14 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 154

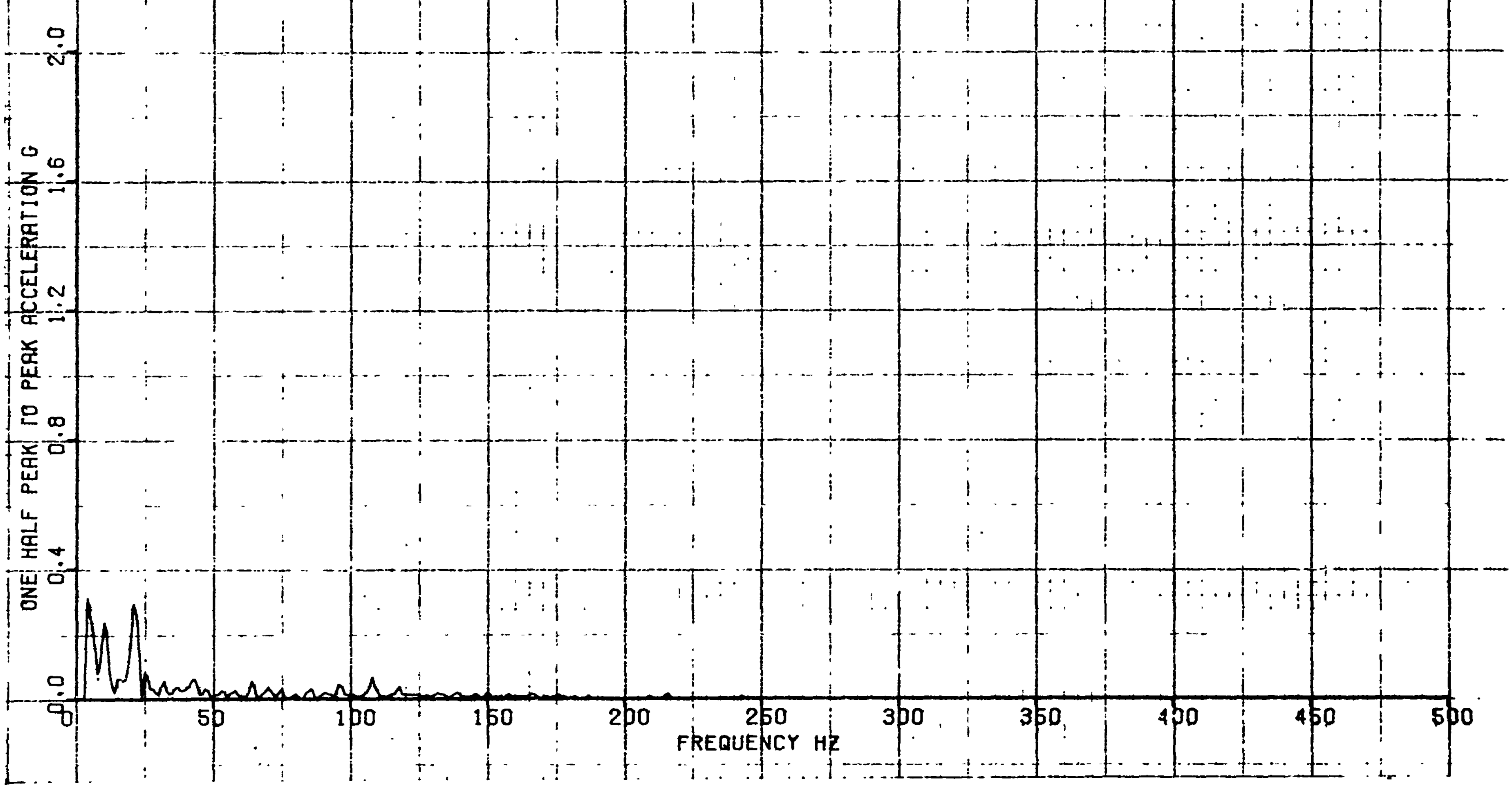
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-LEVEL FLT GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 059

SENSOR LOC 14 COMPRESSION PASS NO.1



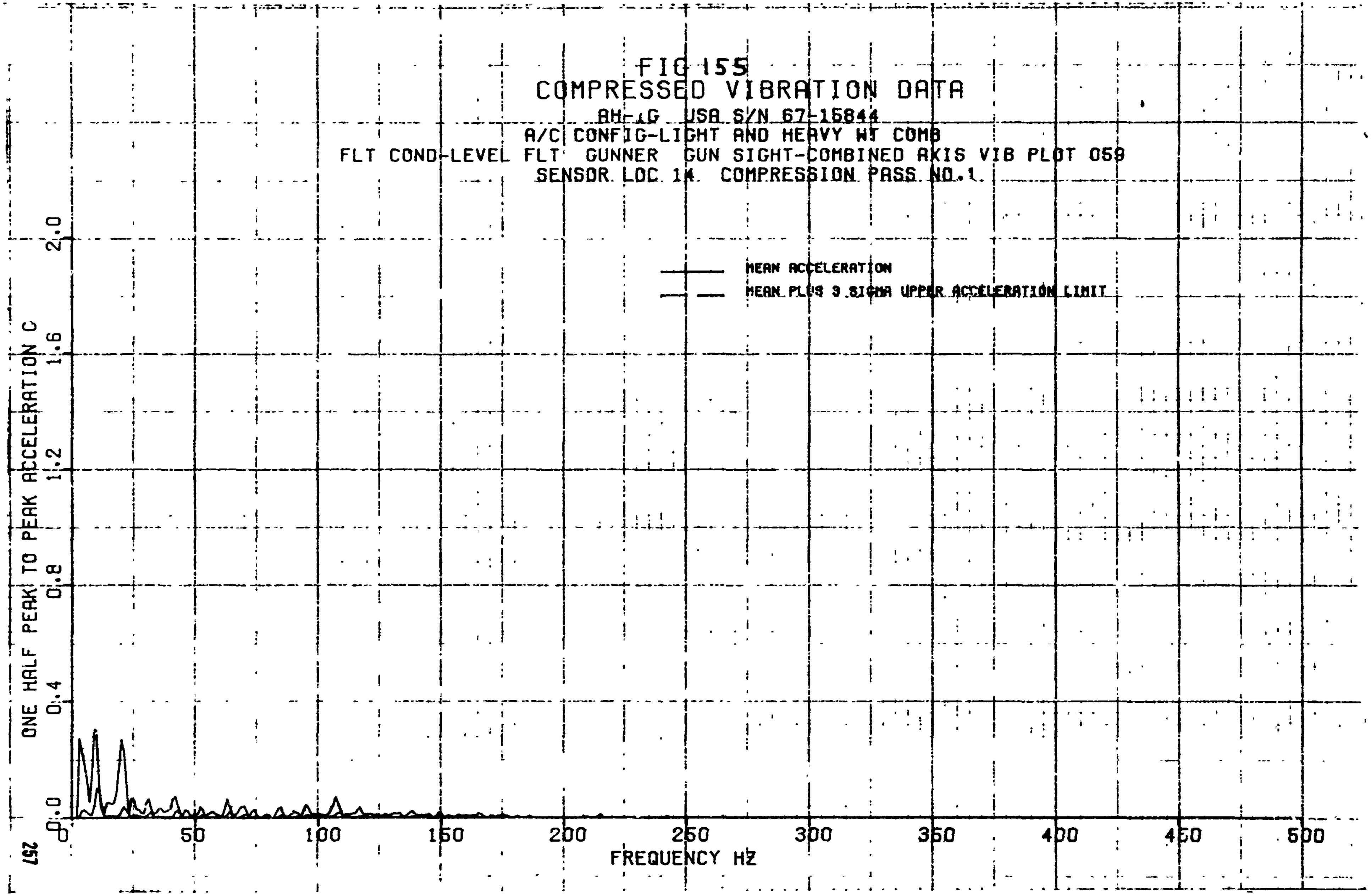


FIG 155
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LEVEL FLT GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 059
SENSOR LOC 14 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

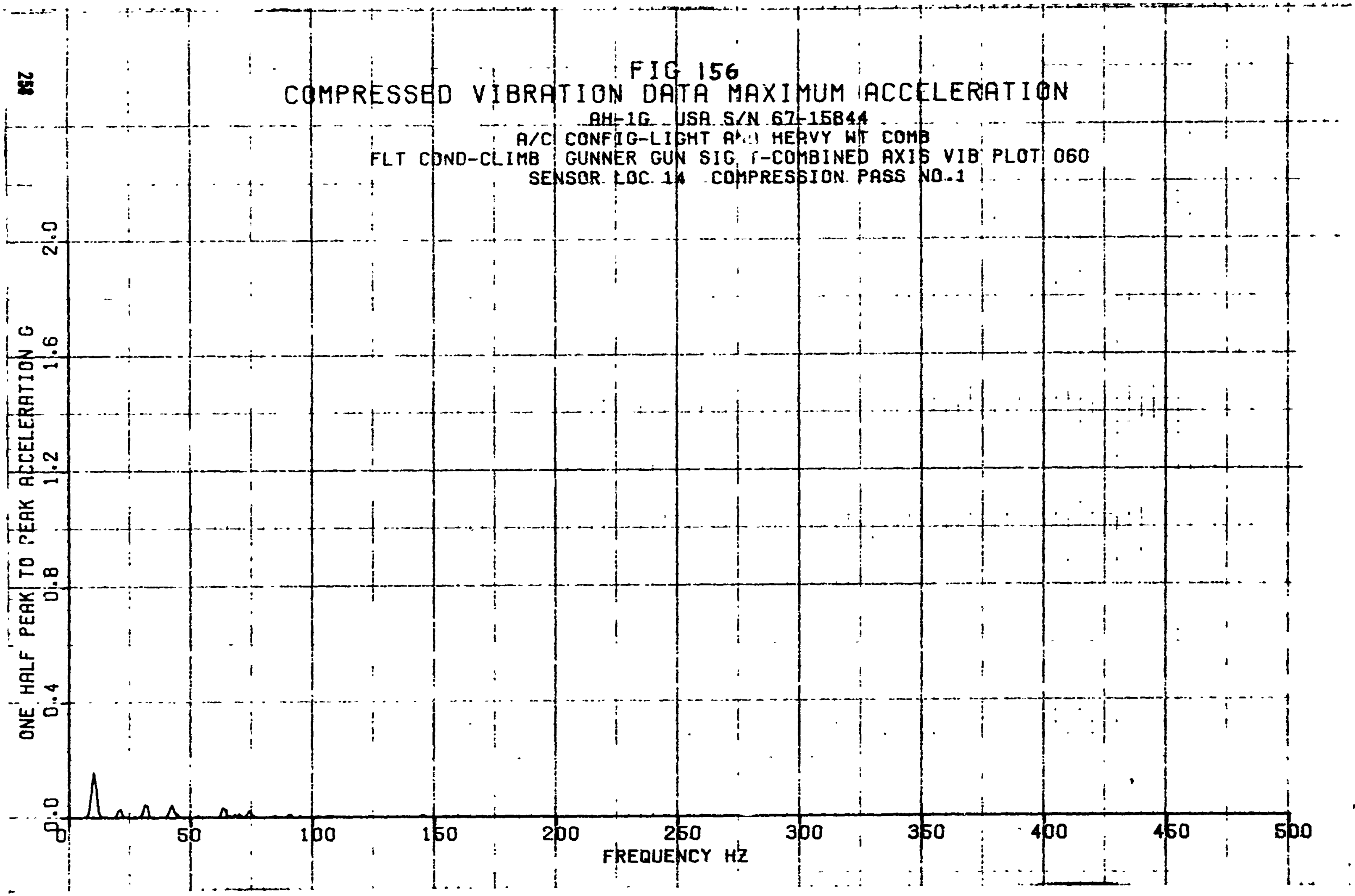


FIG 156
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-CLIMB GUNNER GUN SIG F-COMBINED AXIS VIB PLOT 060
SENSOR LOC 14 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 157
COMPRESSED VIBRATION DATA
?H-1G USA S/N 67-15844
A/C C..FIG-LIGHT AND HEAVY WT COMB
FLT COND-CLIMB , GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 060
SENSOR LOC 14 COMPRESSION PASS NO.1

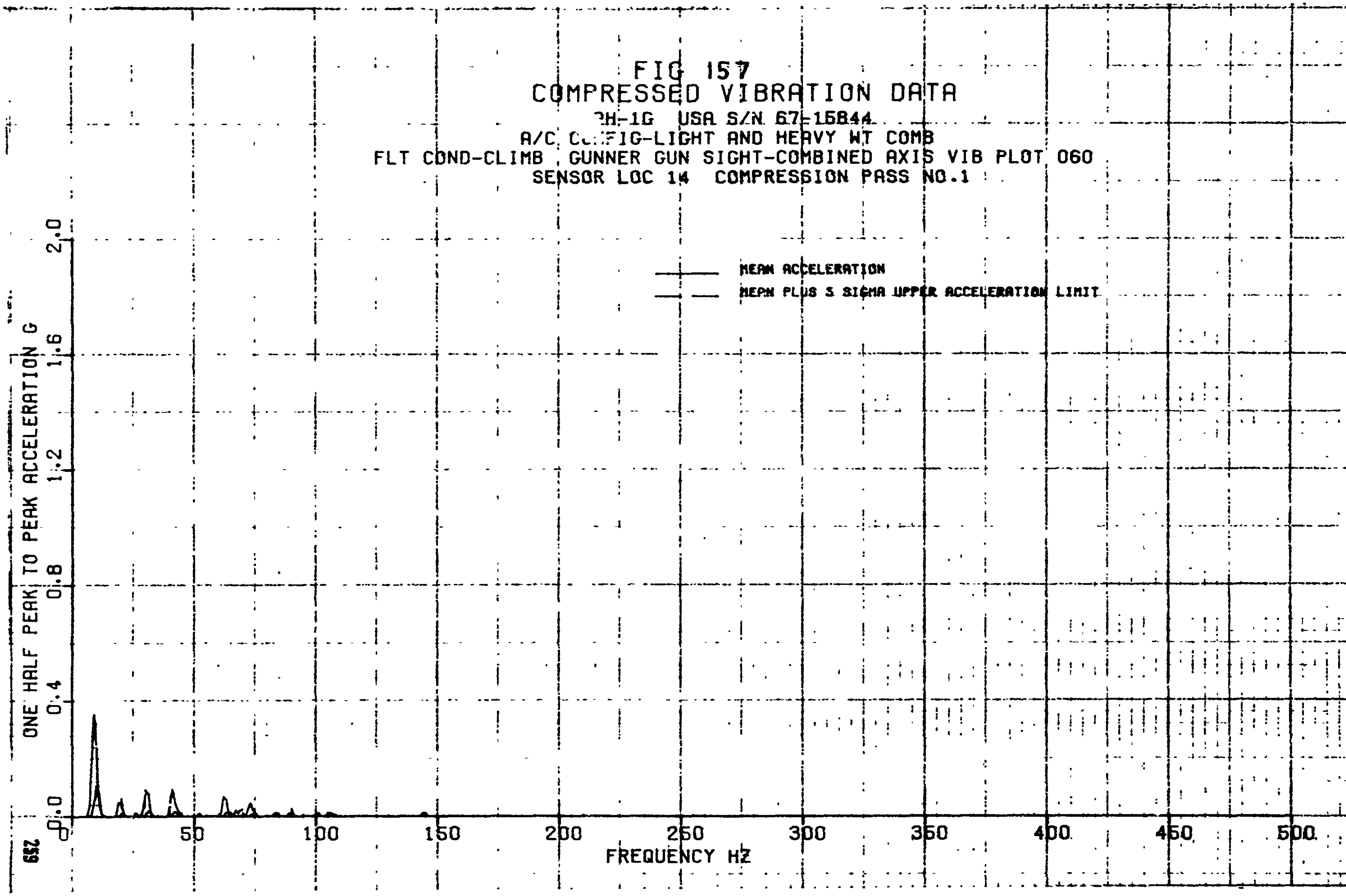


FIG 158

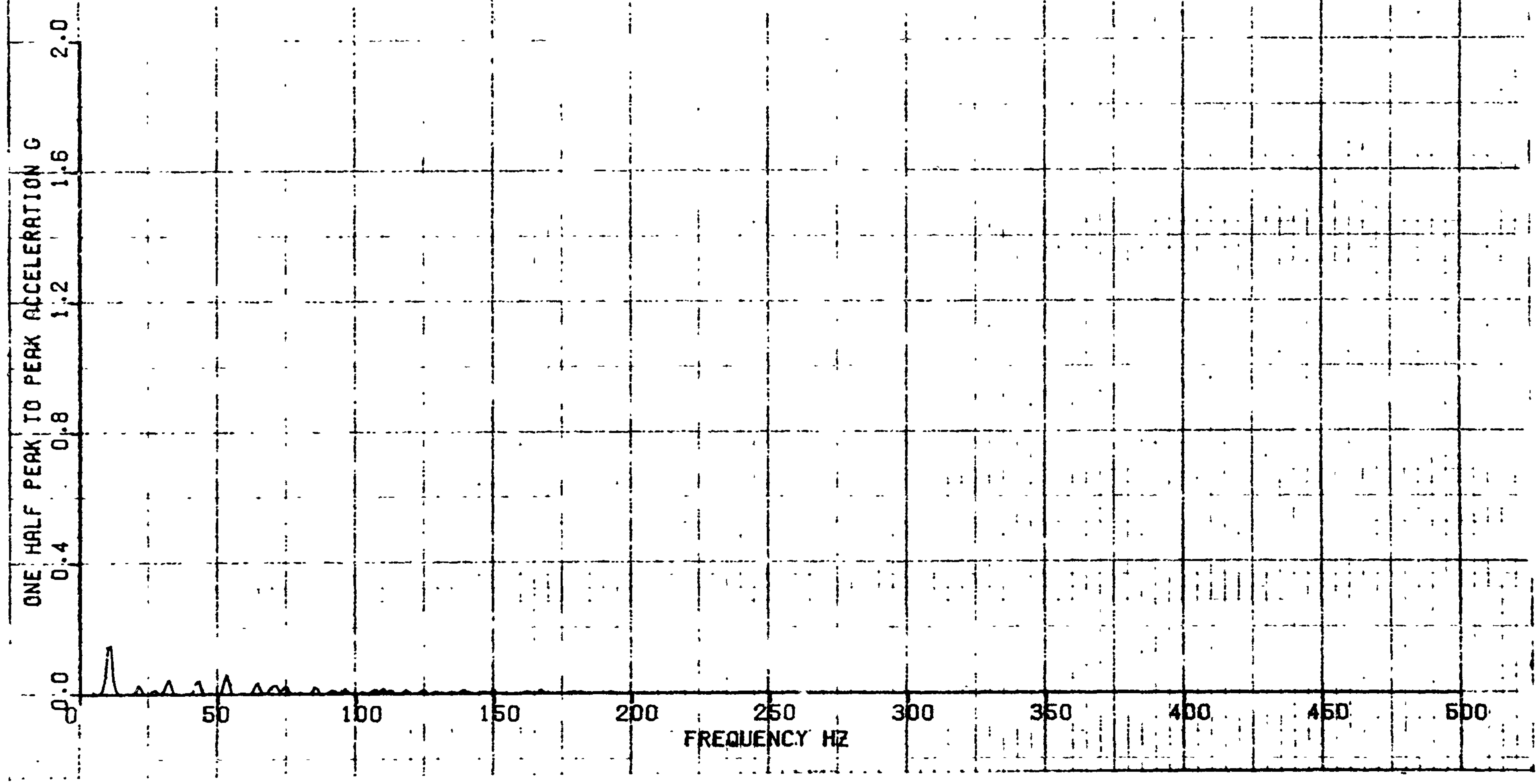
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-DESCENT ; GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 061

SENSOR LOC 14 COMPRESSION PASS NO.1



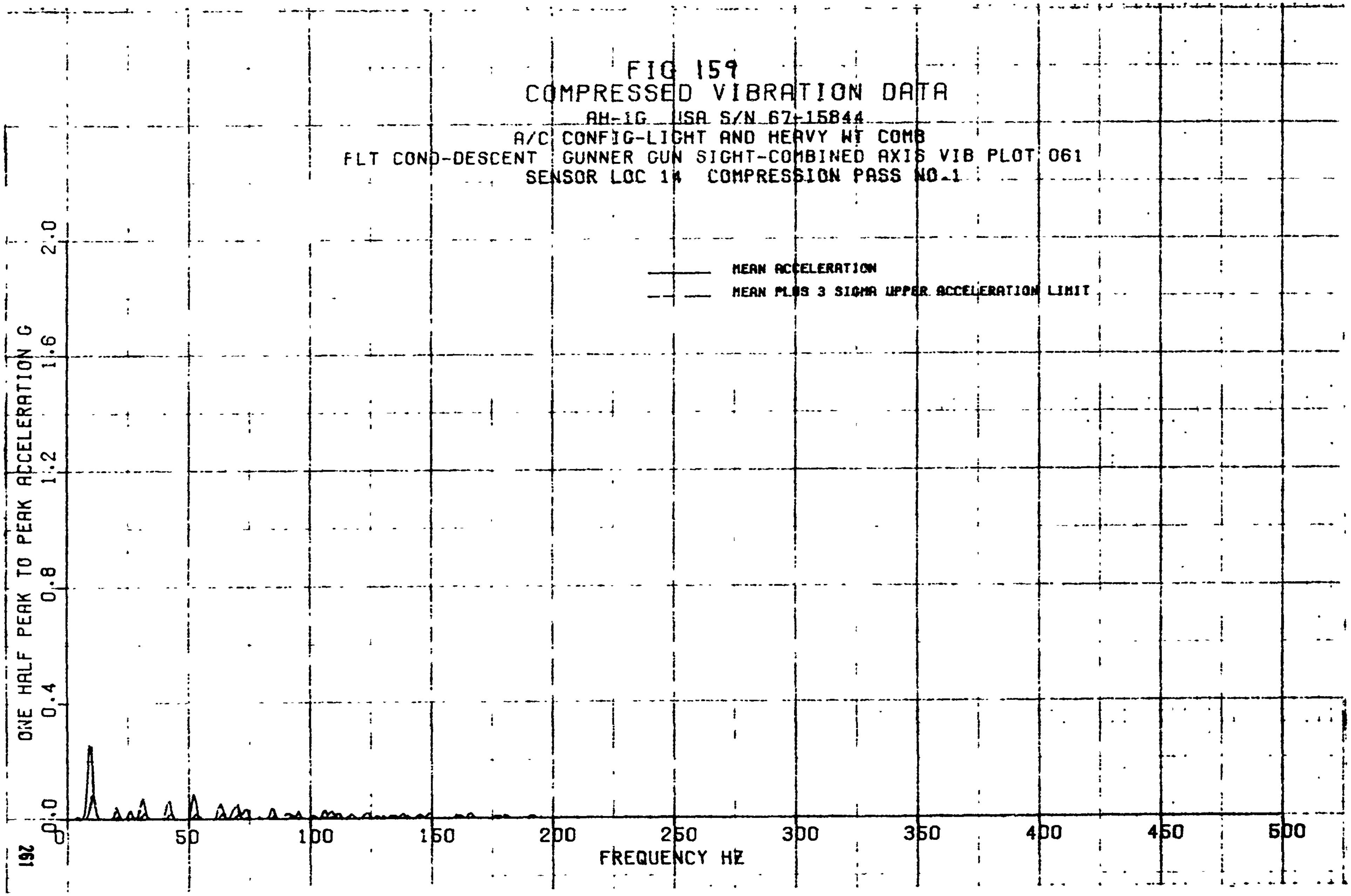


FIG 159
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-DESCENT GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 061
SENSOR LOC 14 COMPRESSION PASS NO-1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

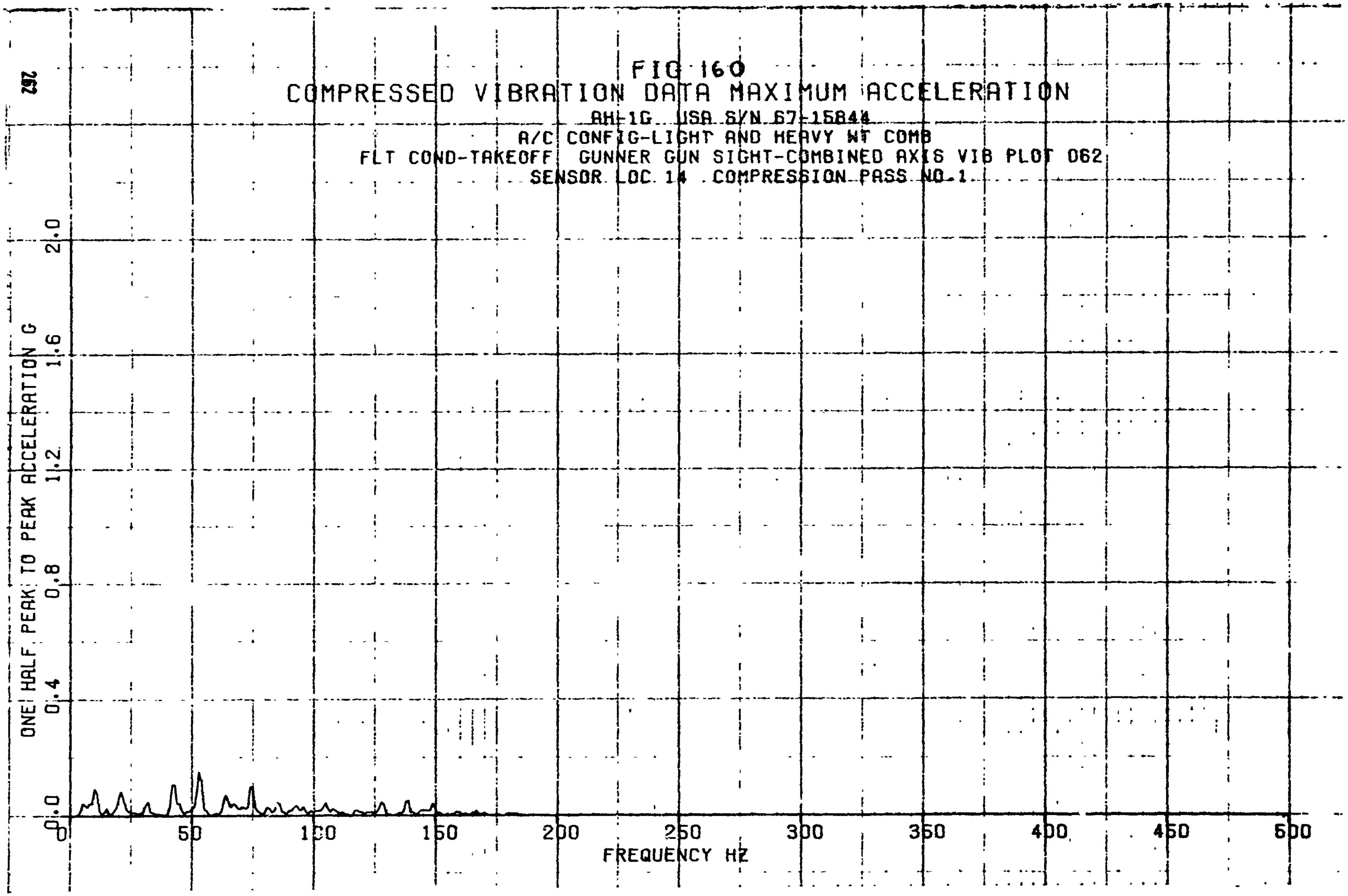


FIG 160
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TAKEOFF GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 062
SENSOR LOC 14 COMPRESSION PASS NO.1

FIG 161
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TAKEOFF GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 062
SENSOR LOC 14 COMPRESSION PASS NO.1

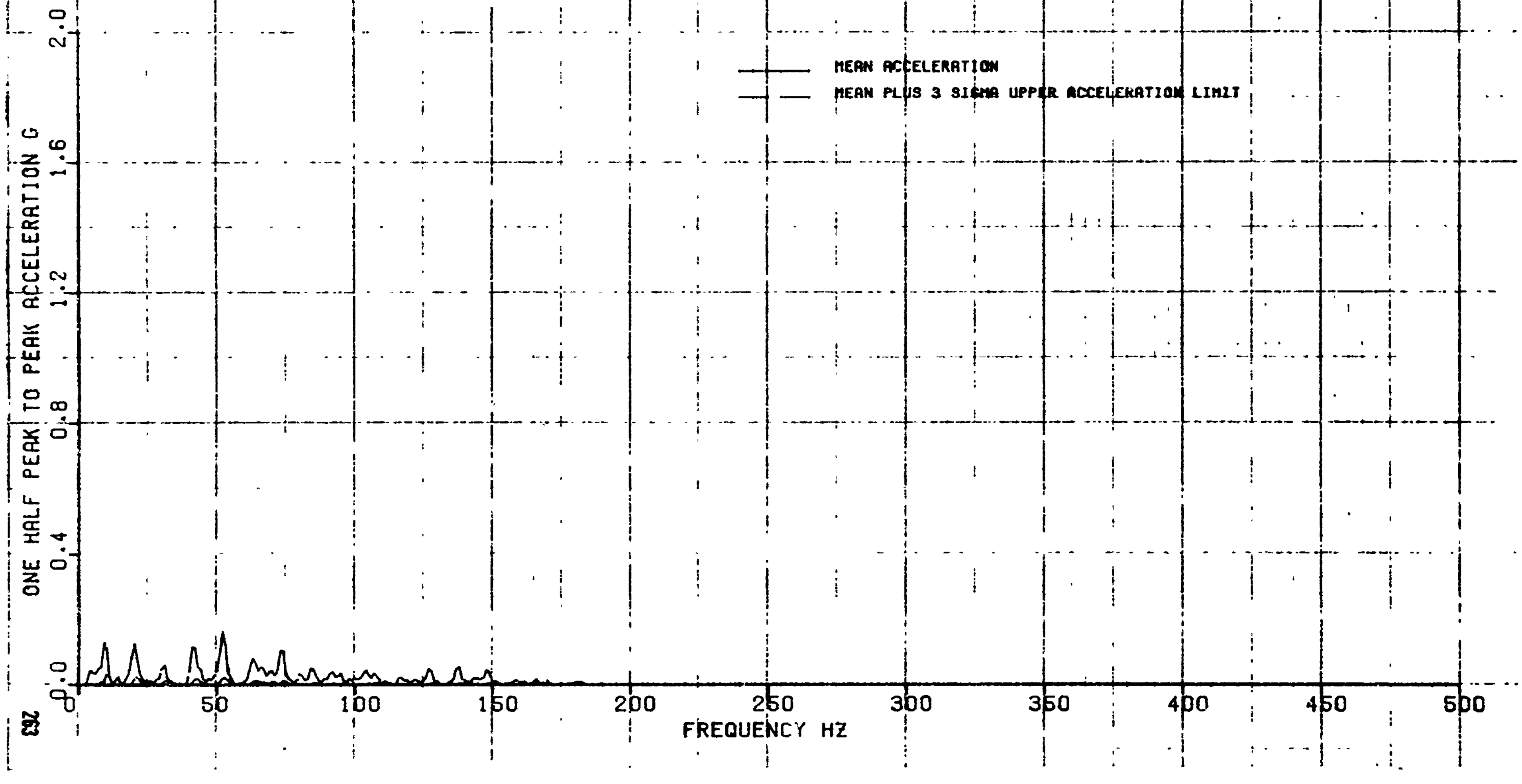
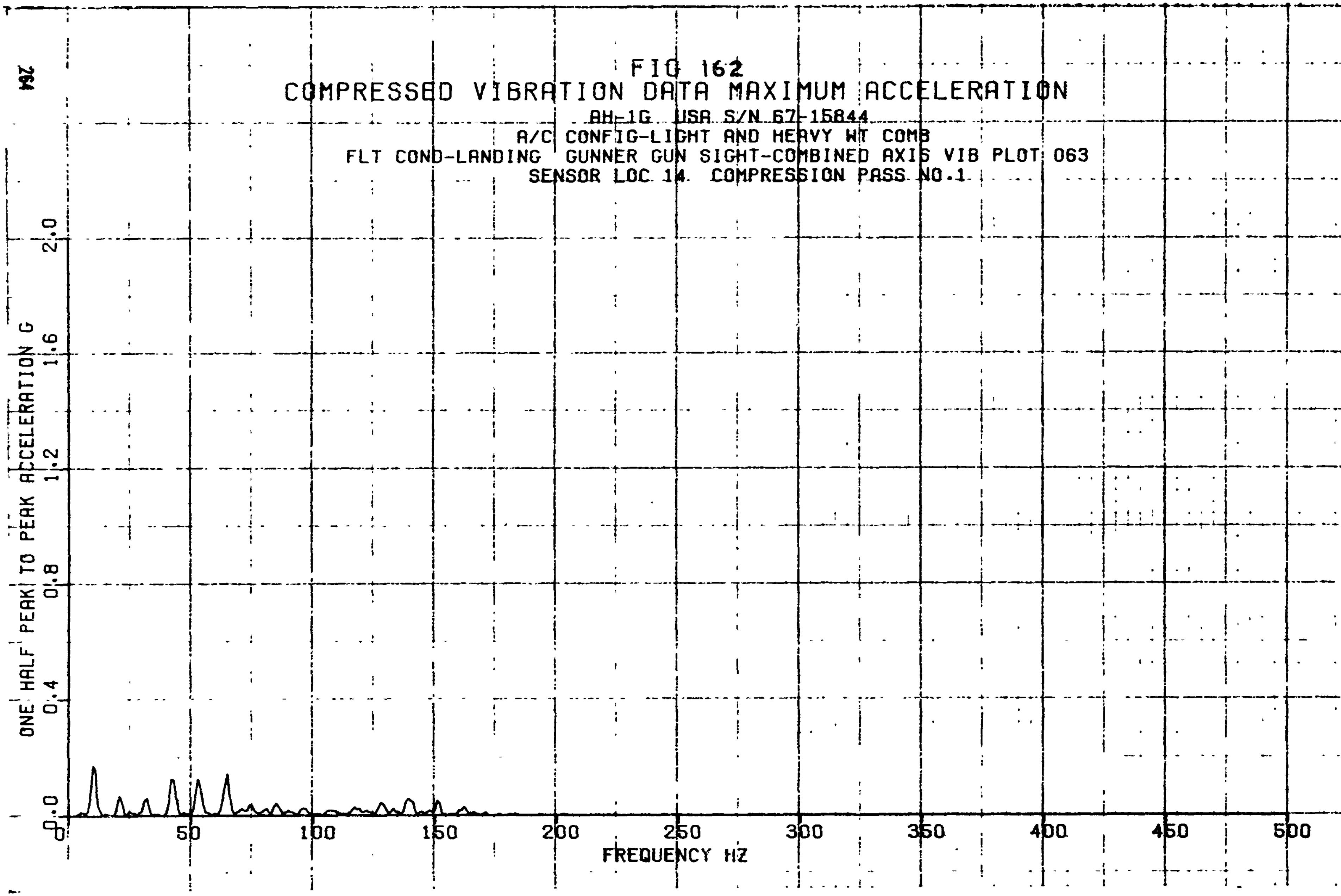


FIG 162
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LANDING GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 063
SENSOR LOC 14 COMPRESSION PASS NO.1



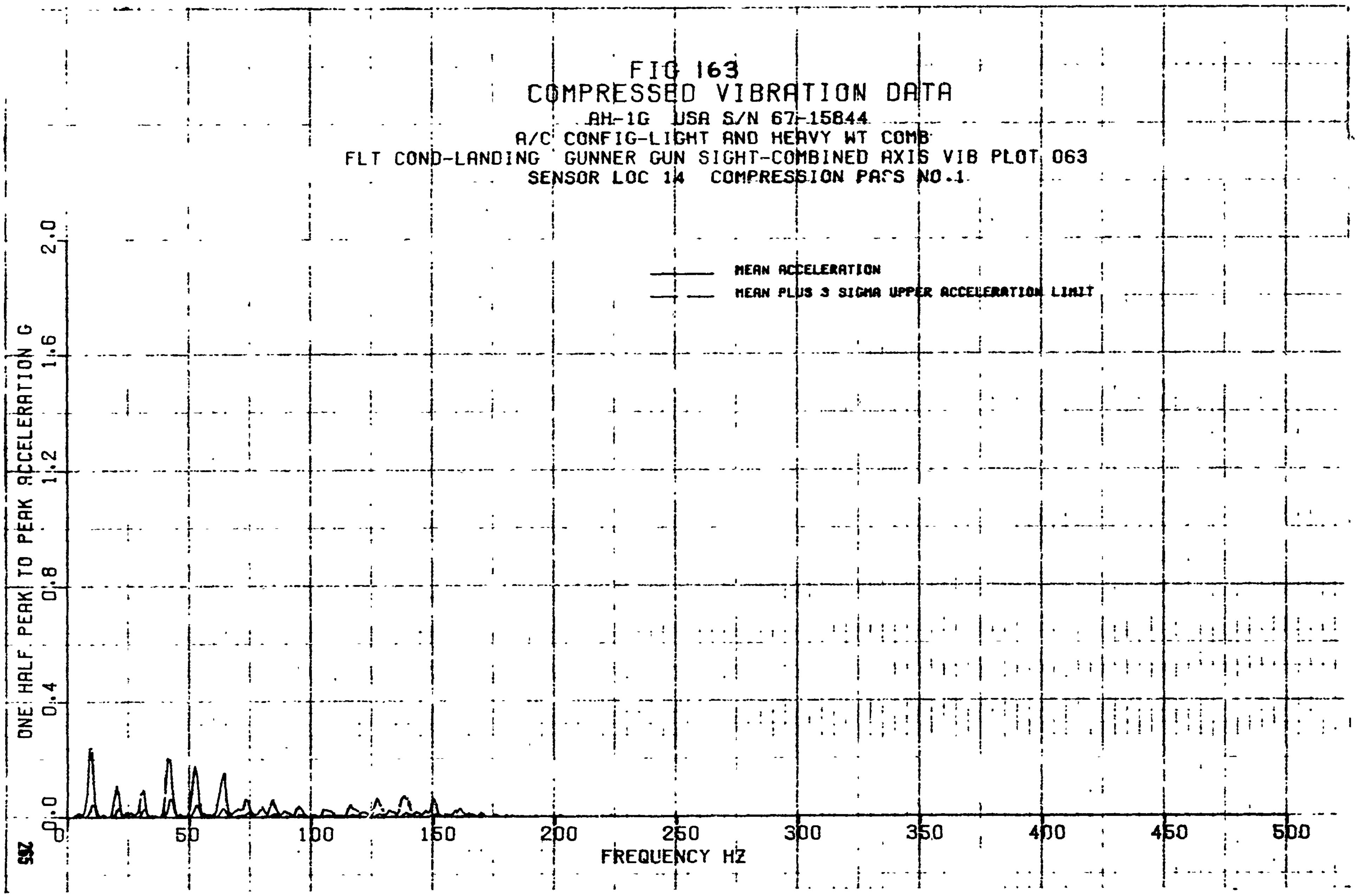
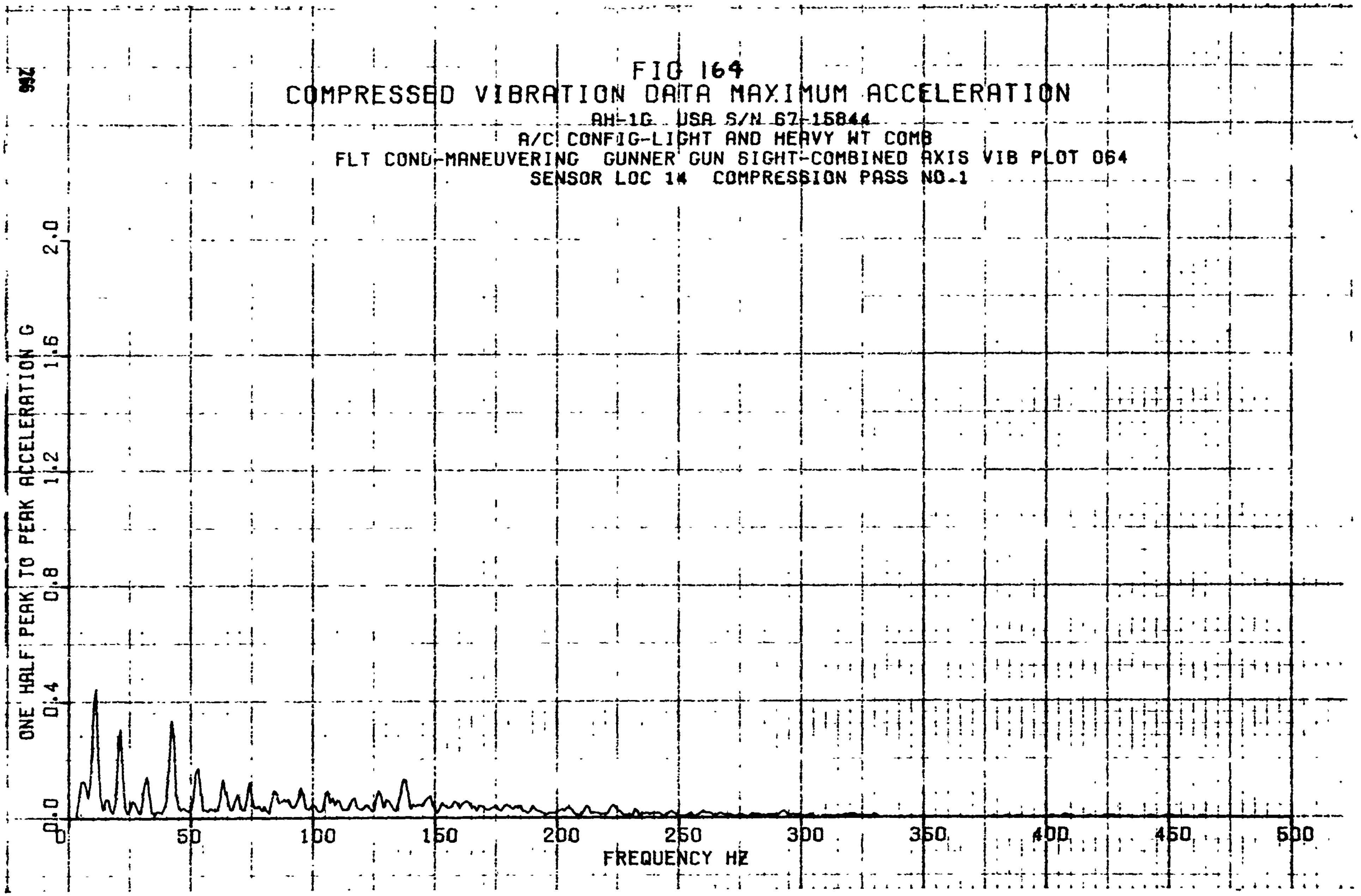


FIG 163
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LANDING GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 063
SENSOR LOC 14 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 164
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-MANEUVERING GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 064
SENSOR LOC 14 COMPRESSION PASS NO-1



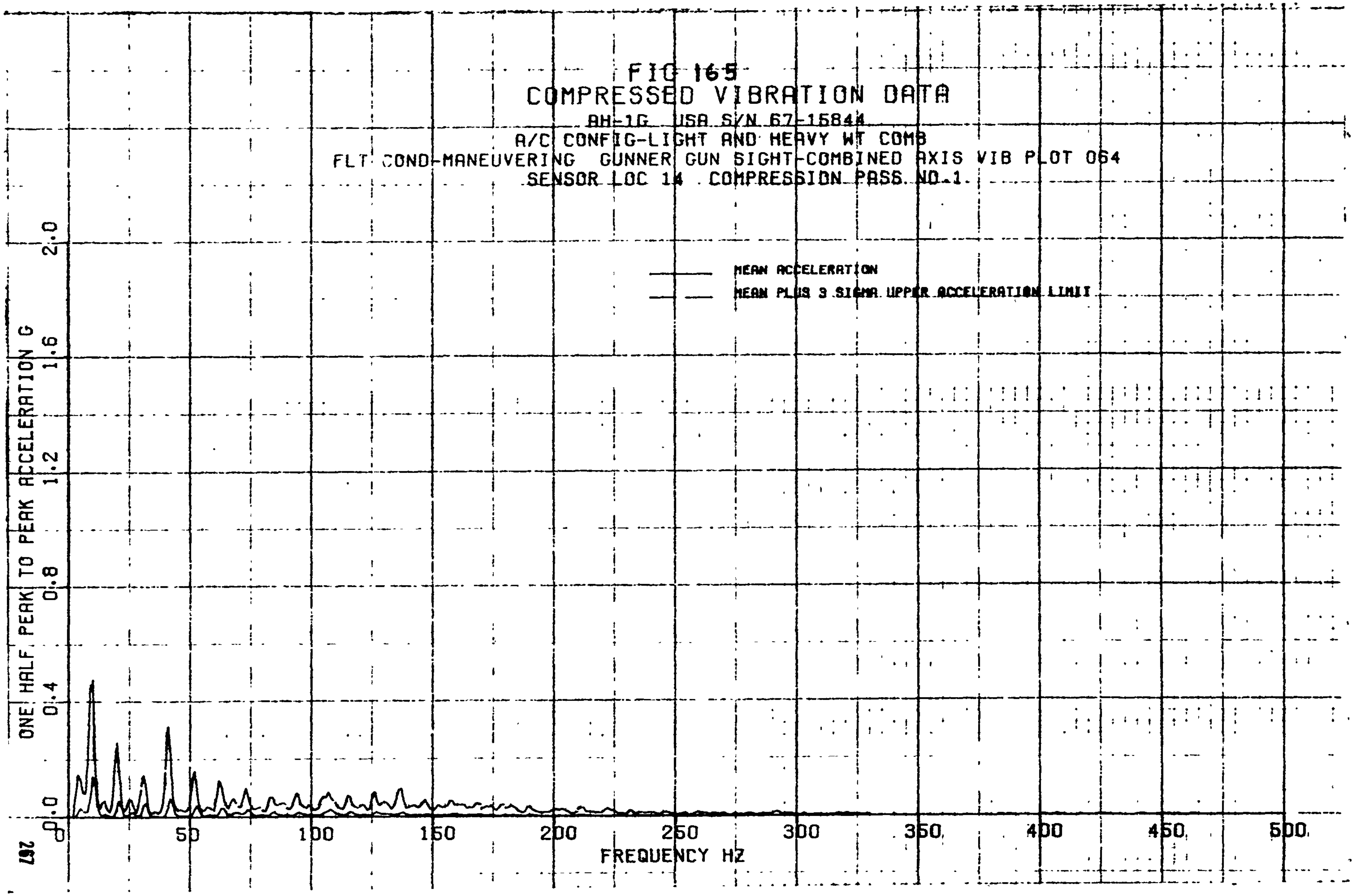


FIG 165
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-MANEUVERING GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 064
SENSOR LOC 14 COMPRESSION PASS NO.1

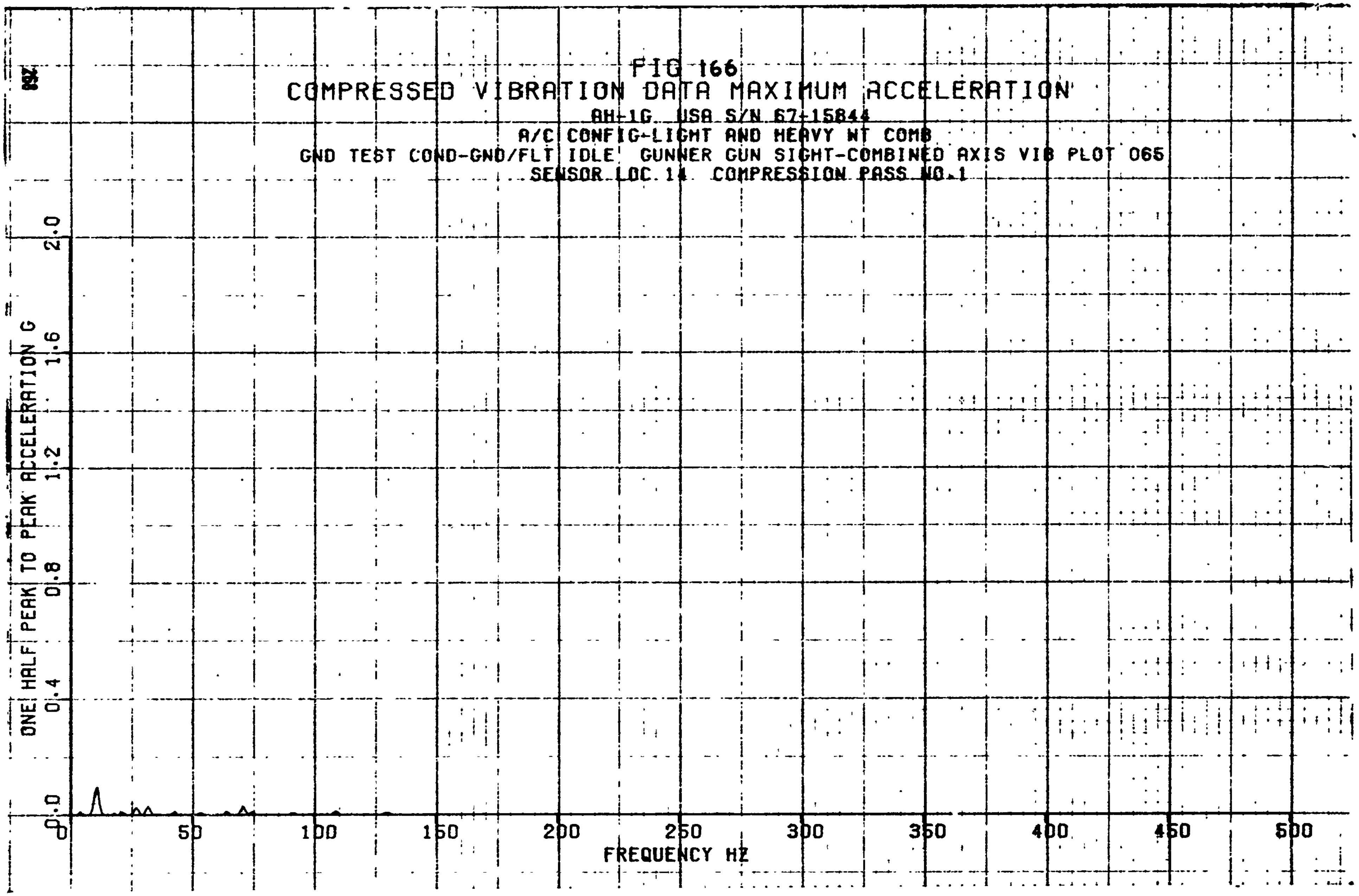


FIG 166
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
GND TEST COND-GND/FLT IDLE GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 065
SENSOR LOC 14 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 167

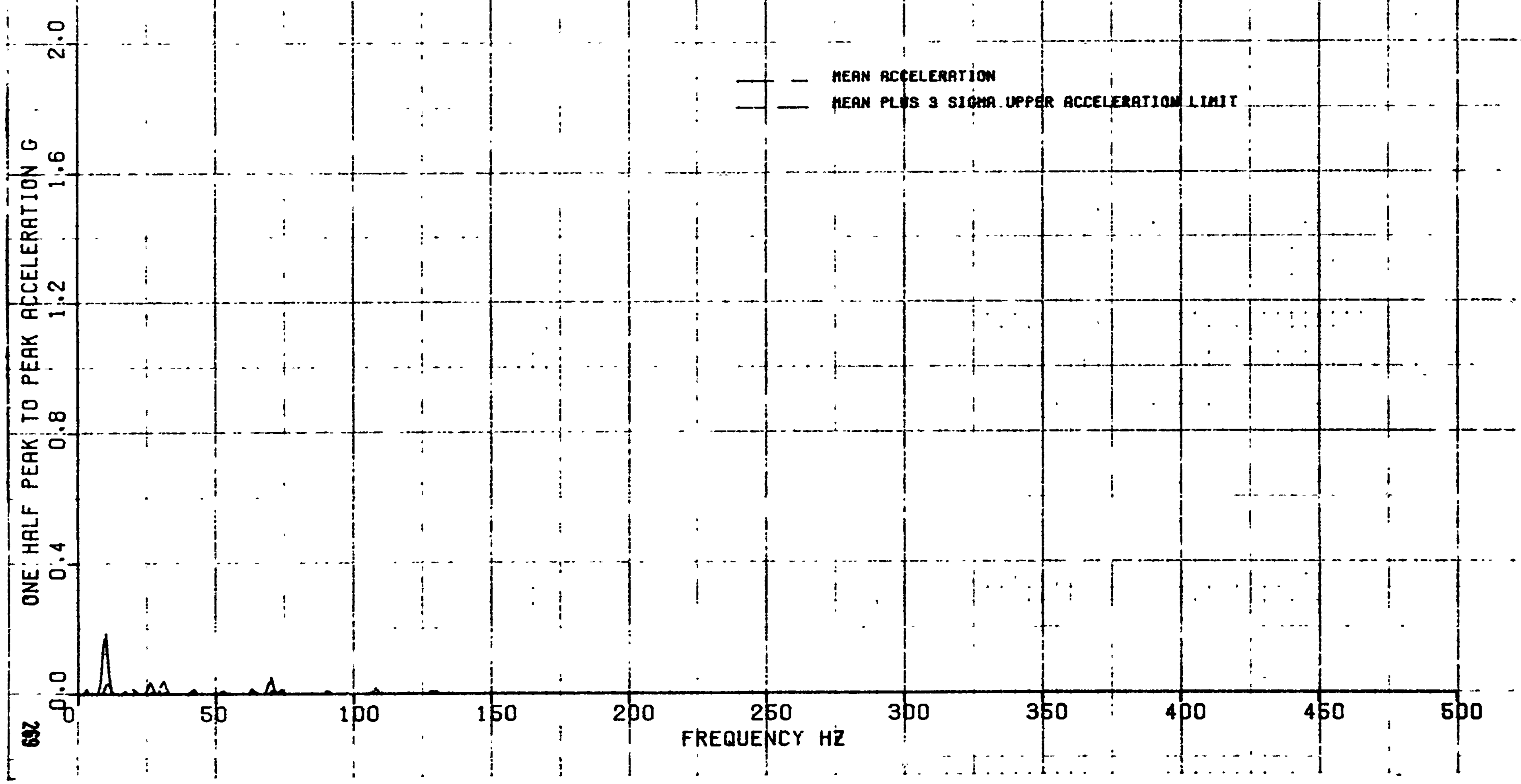
COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

GND TEST COND-GND/FLT IDLE GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 066

SENSOR LOC 14 COMPRESSION PASS NO.1



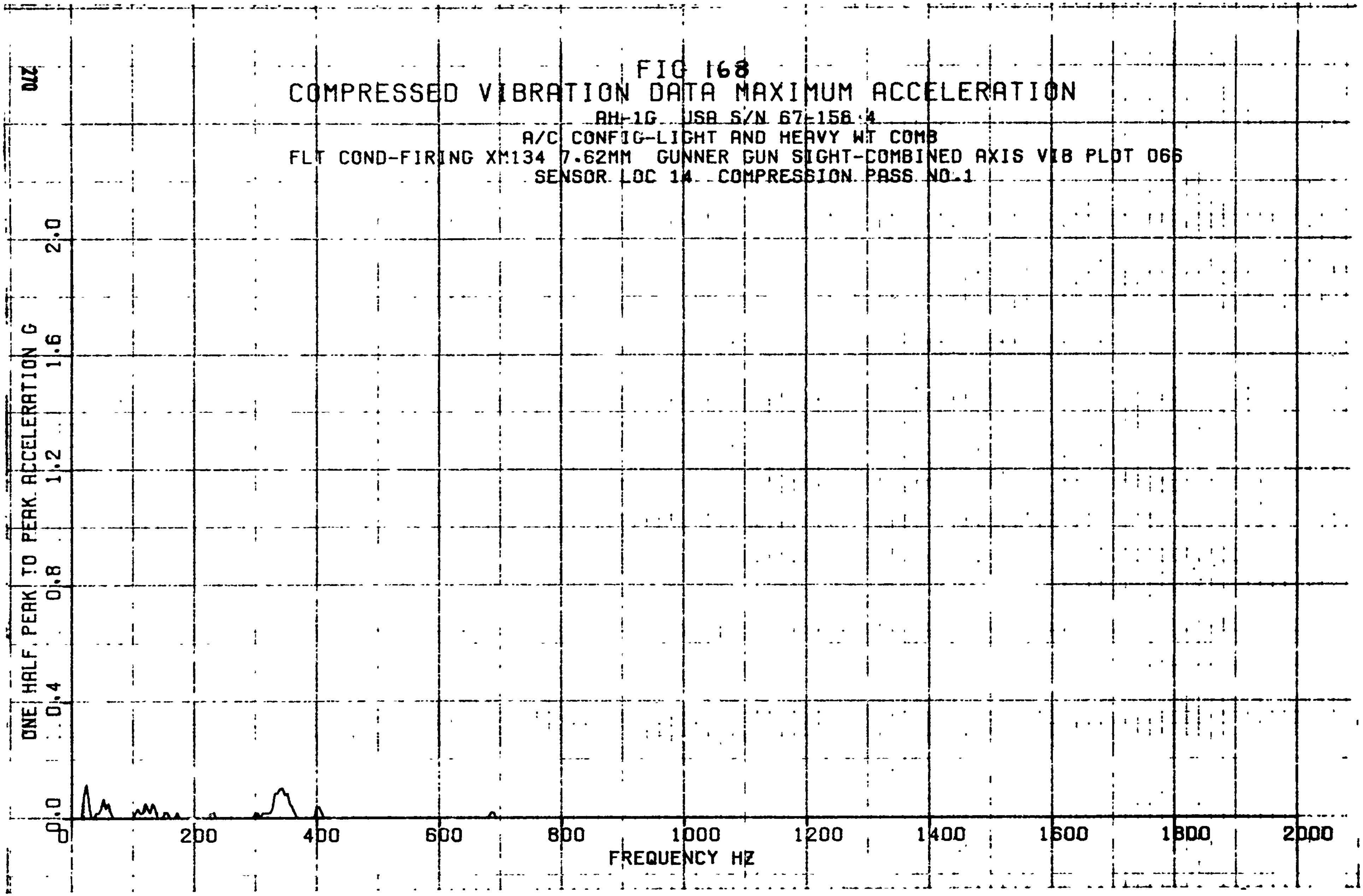


FIG 168
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-156 4
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM134 7.62MM GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 066
SENSOR LOC 14 COMPRESSION PASS NO 1

FIG 169

COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-FIRING XM134 7.62MM GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 066

SENSOR LOC 14 COMPRESSION PASS NO.1

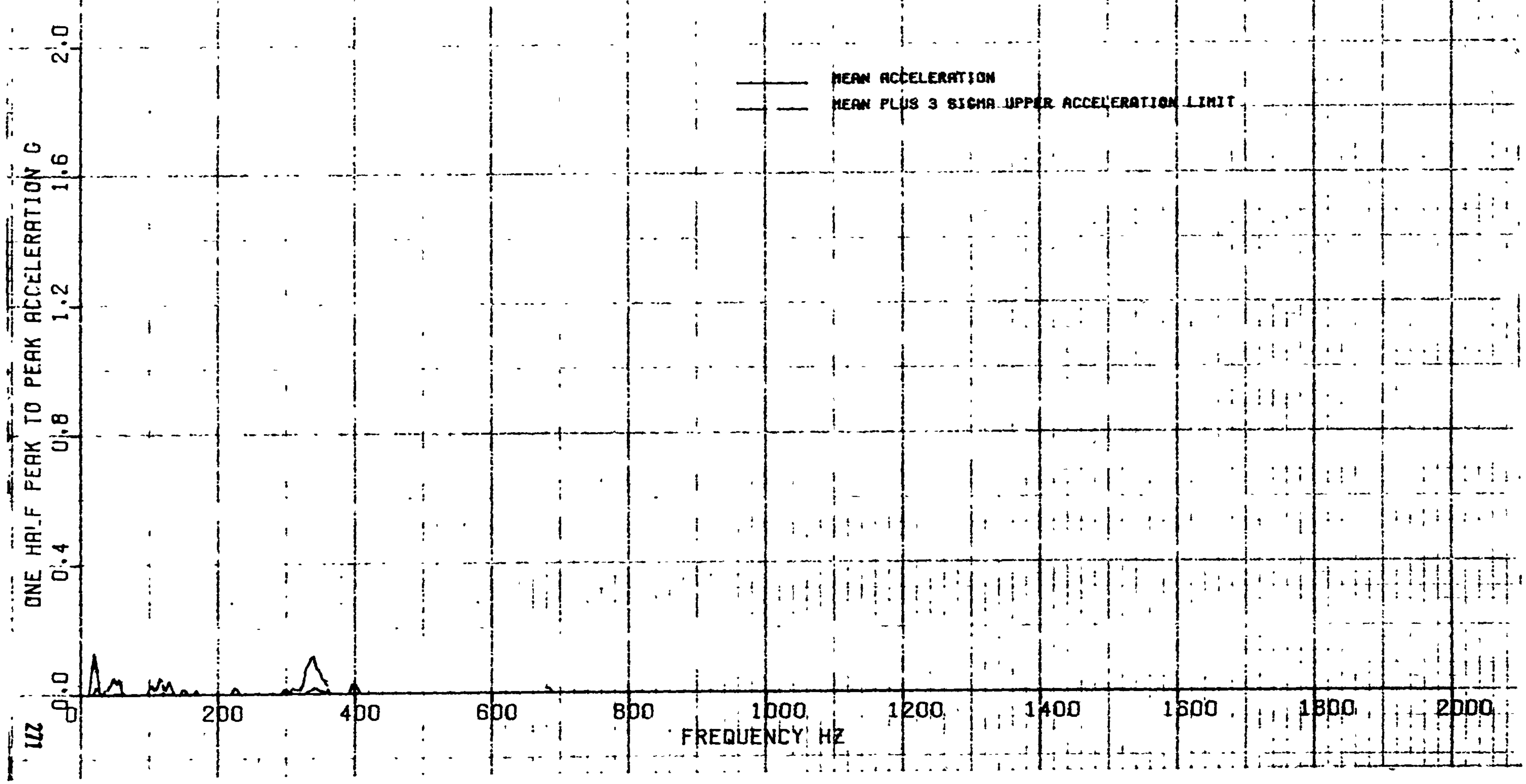


FIG 170

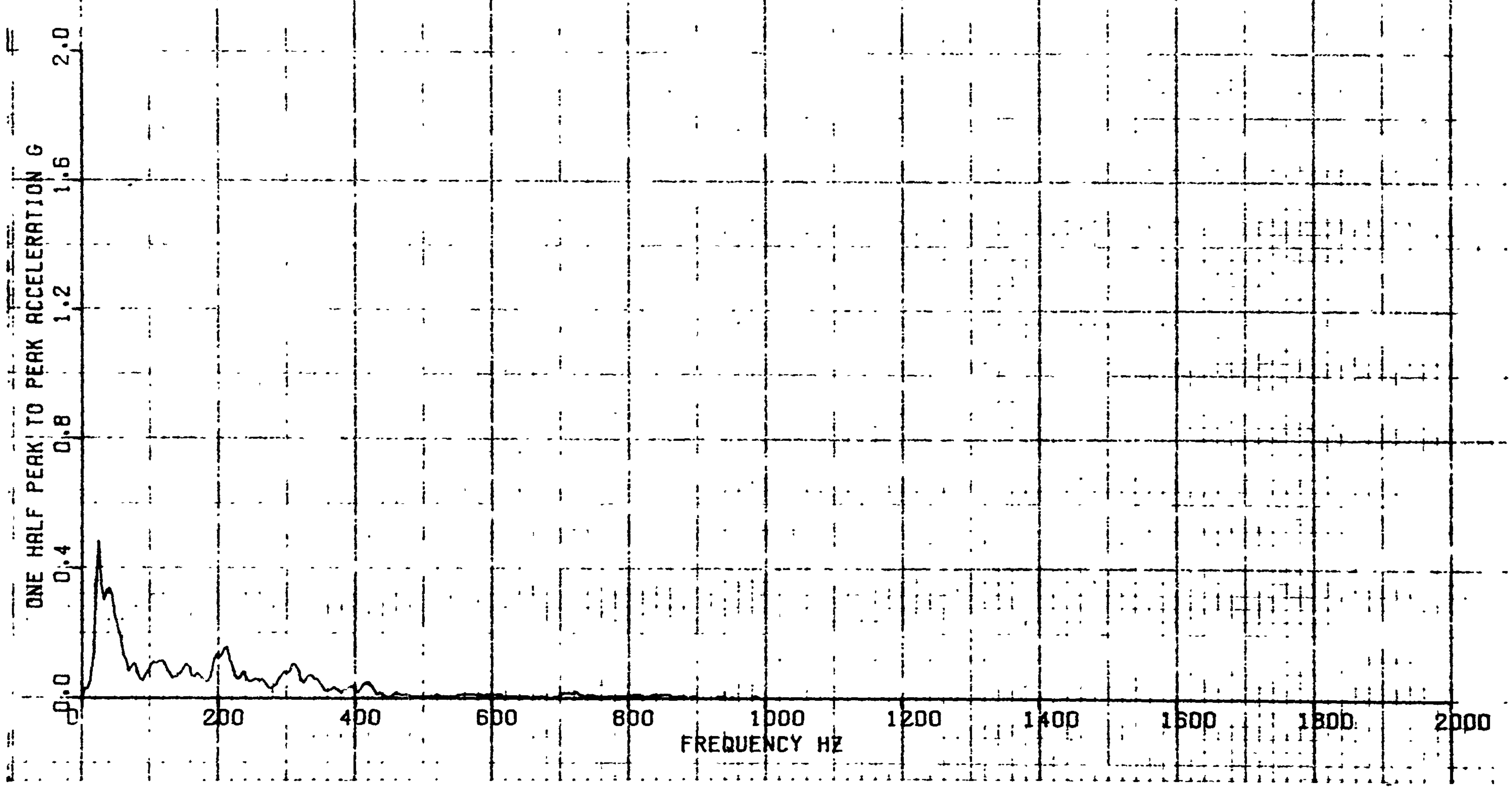
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-FIRING XM129 40MM GRENADE GUNNER GUN SIGHT-COMB AXIS VIB PLOT 067

SENSOR LOC 1A COMPRESSION PASS NO.1



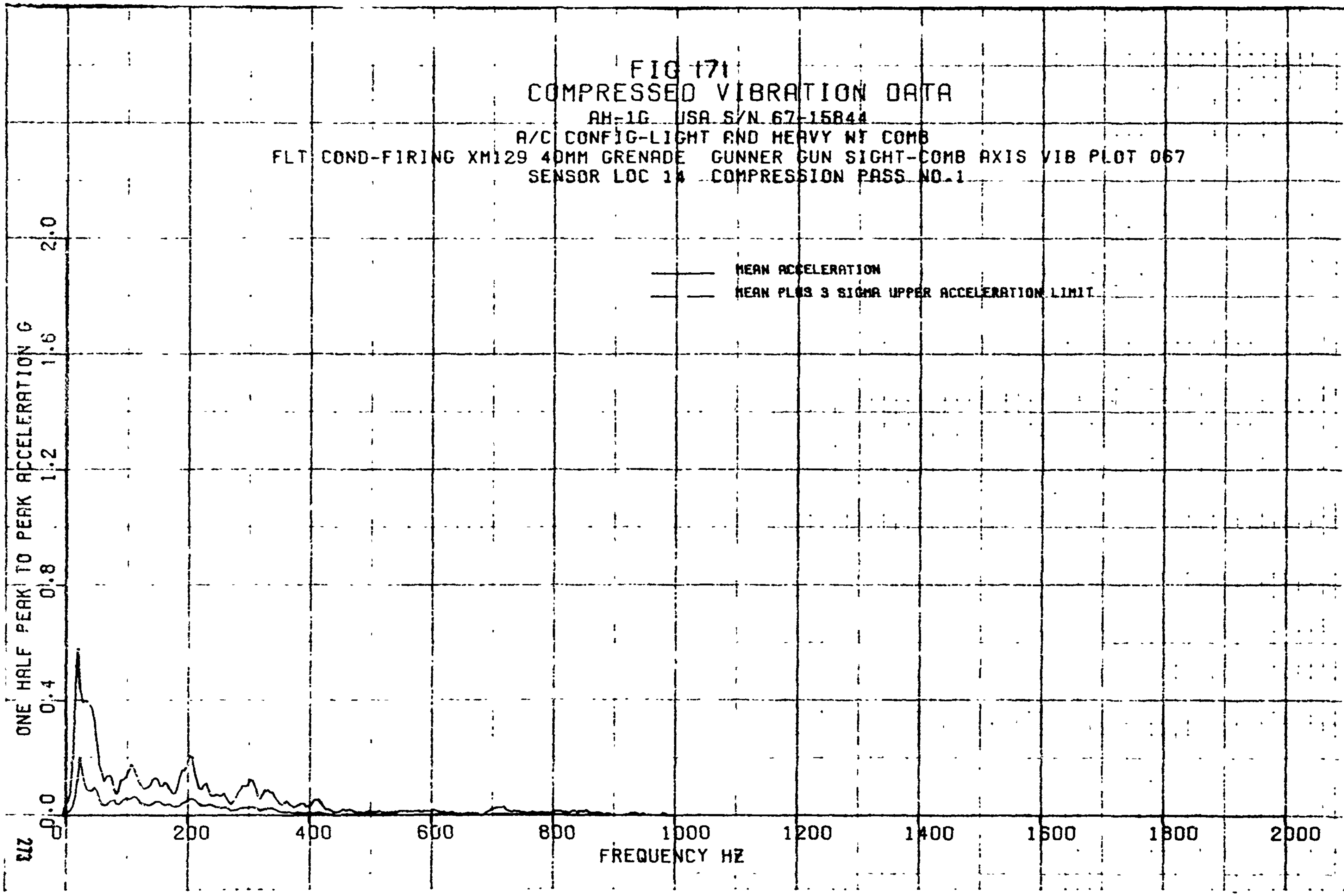


FIG 171
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM129 40MM GRENADE GUNNER GUN SIGHT-COMB AXIS VIB PLOT 067
SENSOR LOC 14 COMPRESSION PASS NO.1

FIG 172
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM35 20MM GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 069
SENSOR LOC 1A COMPRESS.ON PASS NO.1

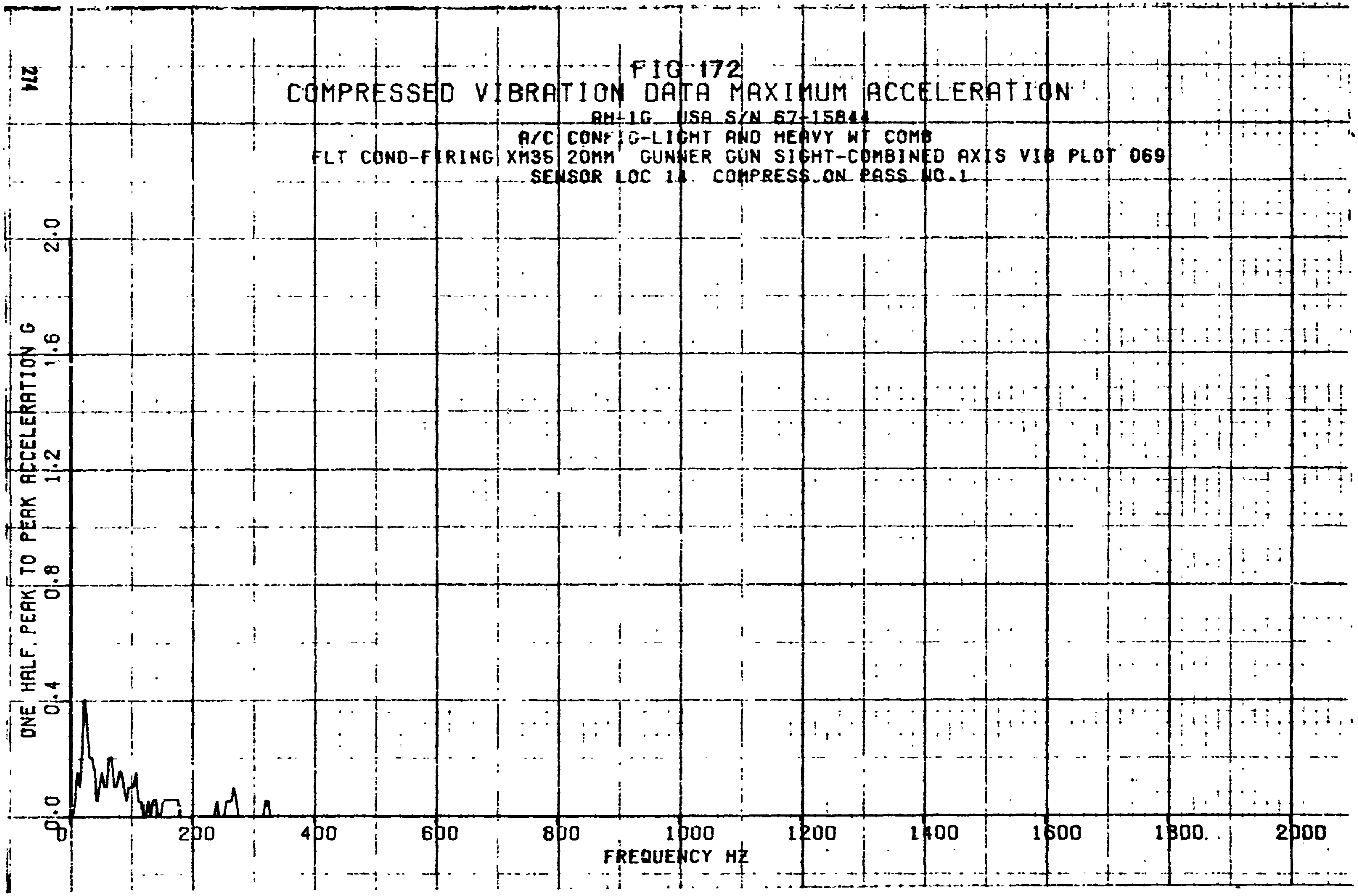
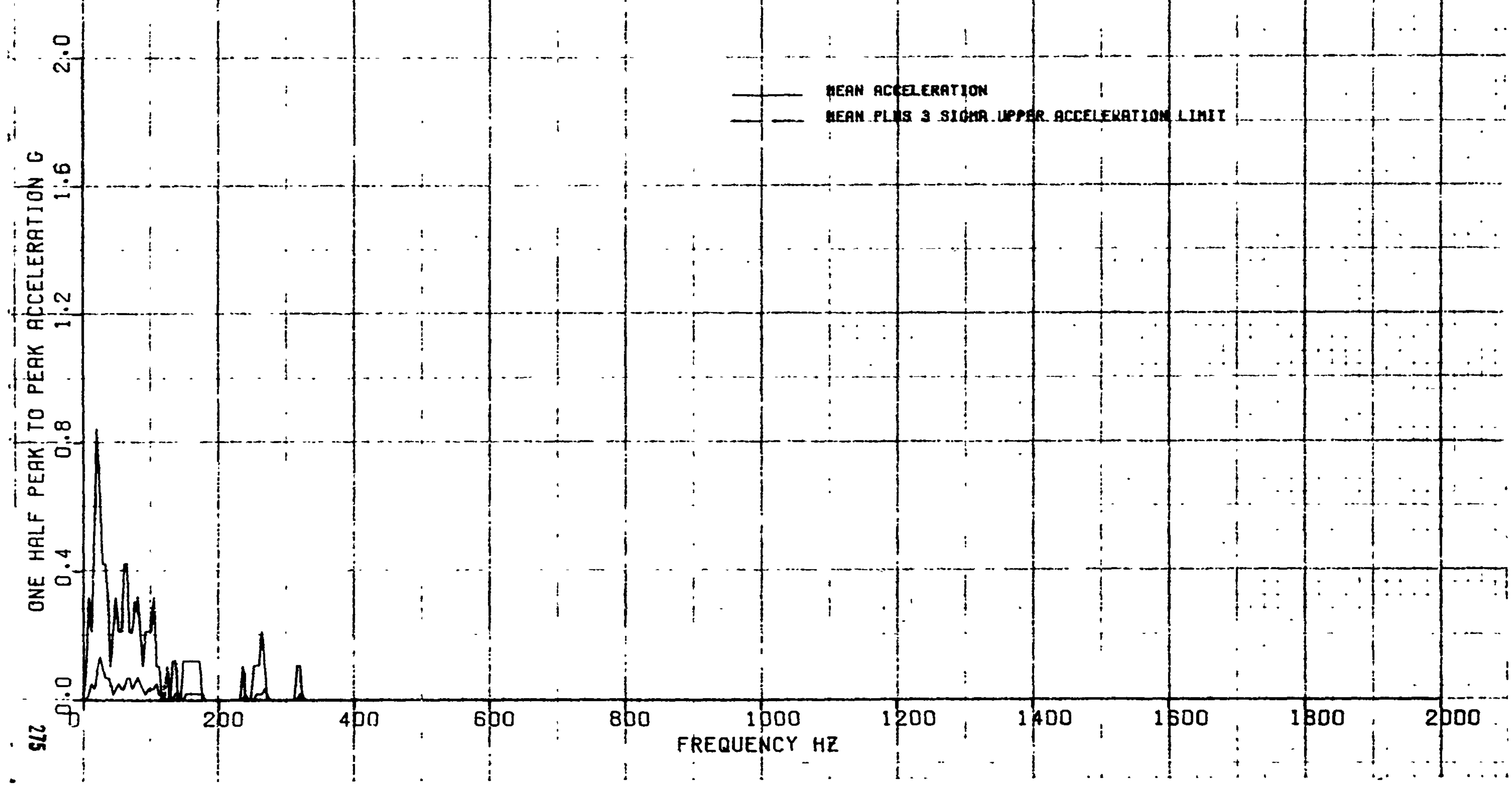


FIG 173
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM35 20MM GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 069
SENSOR LOC 14 COMPRESSION PASS NO.1



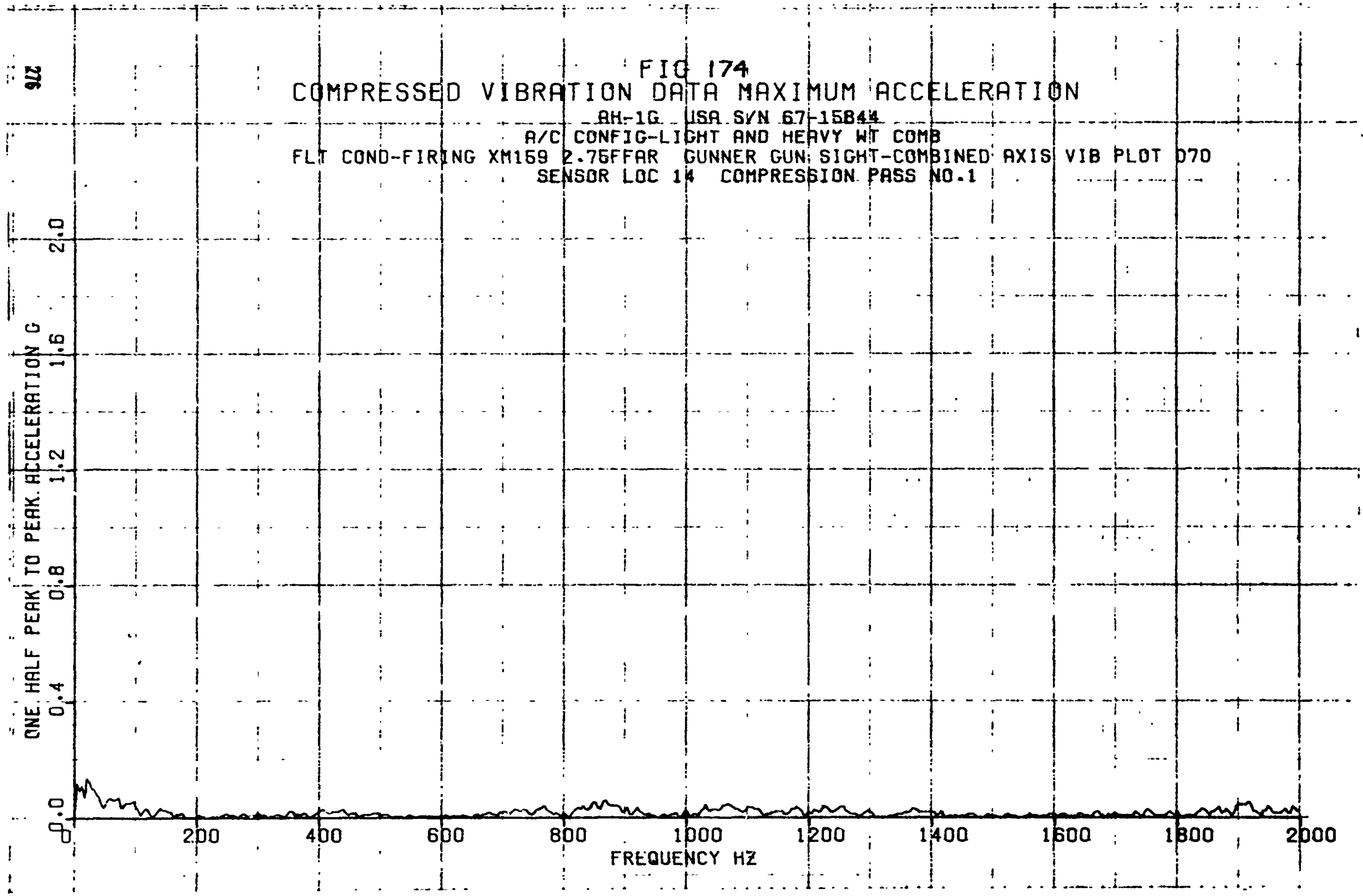


FIG 174
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM159 2.75FFAR GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT D70
SENSOR LOC 14 COMPRESSION PASS NO.1

FIG 175

COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-FIRING XM159 2.75FFAR GUNNER GUN SIGHT-COMBINED AXIS VIB PLOT 070

SENSOR LOC 14 COMPRESSION PASS NO.1

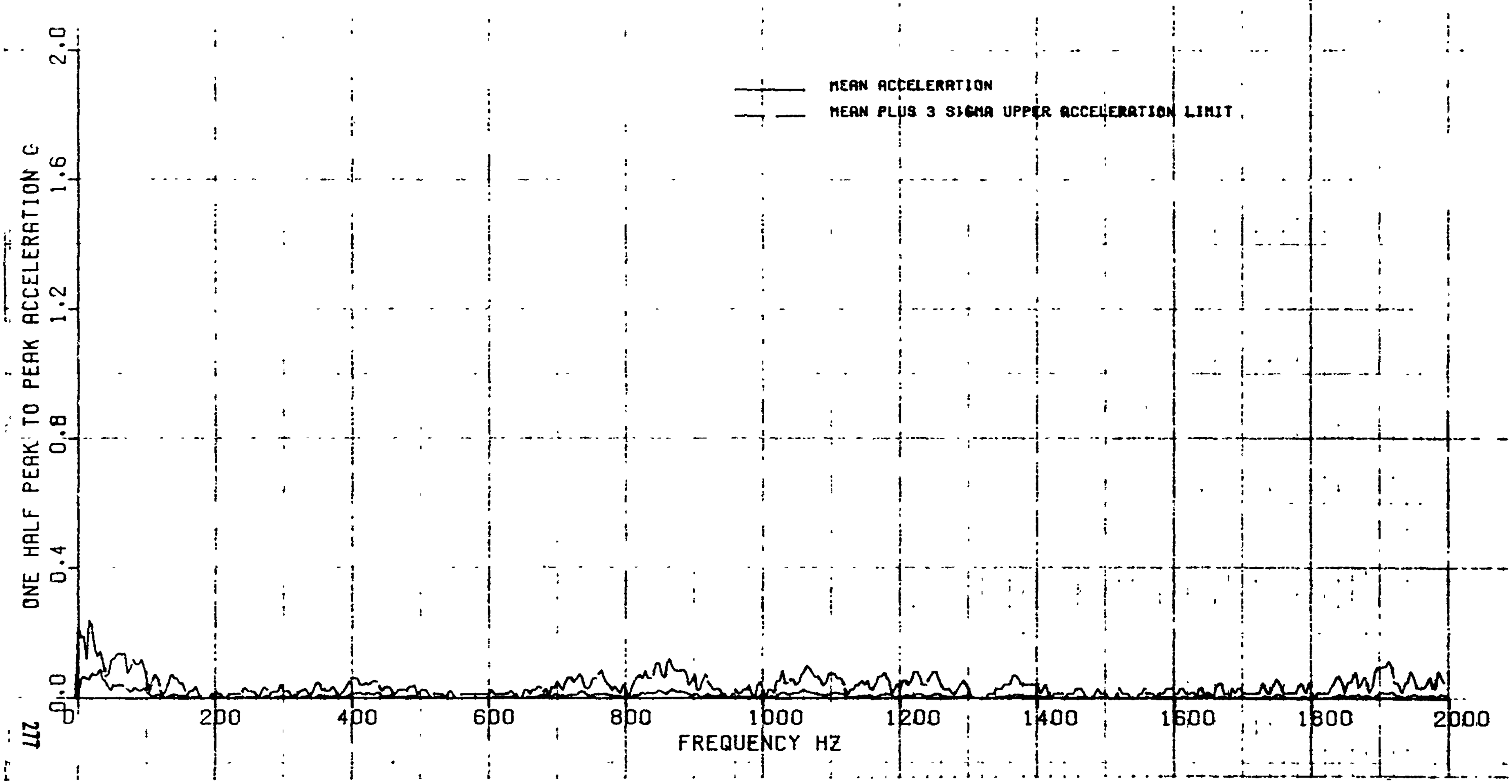


FIG 176

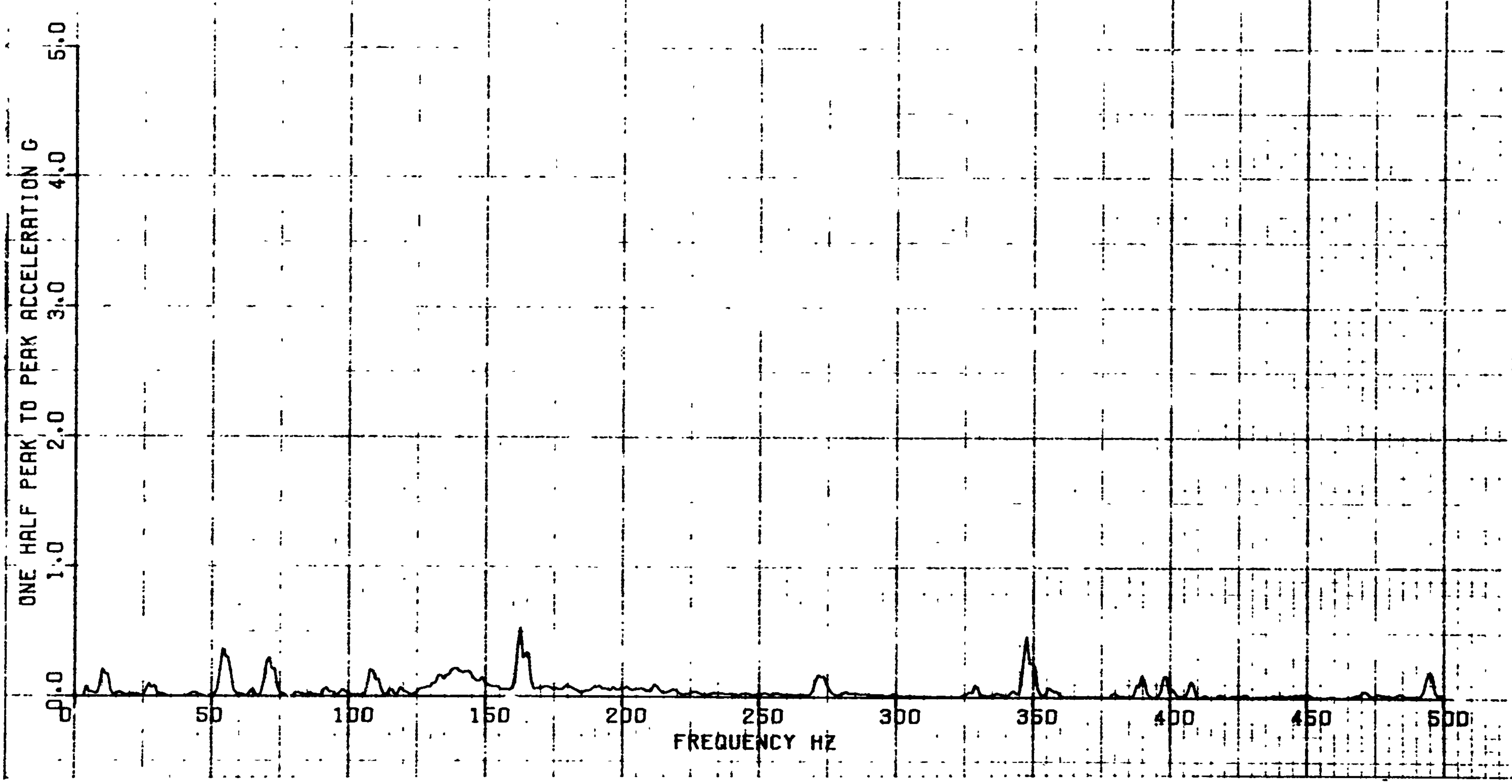
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-HOVER AVIONICS EQUIP-COMBINED AXIS VIB PLOT 071

SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1



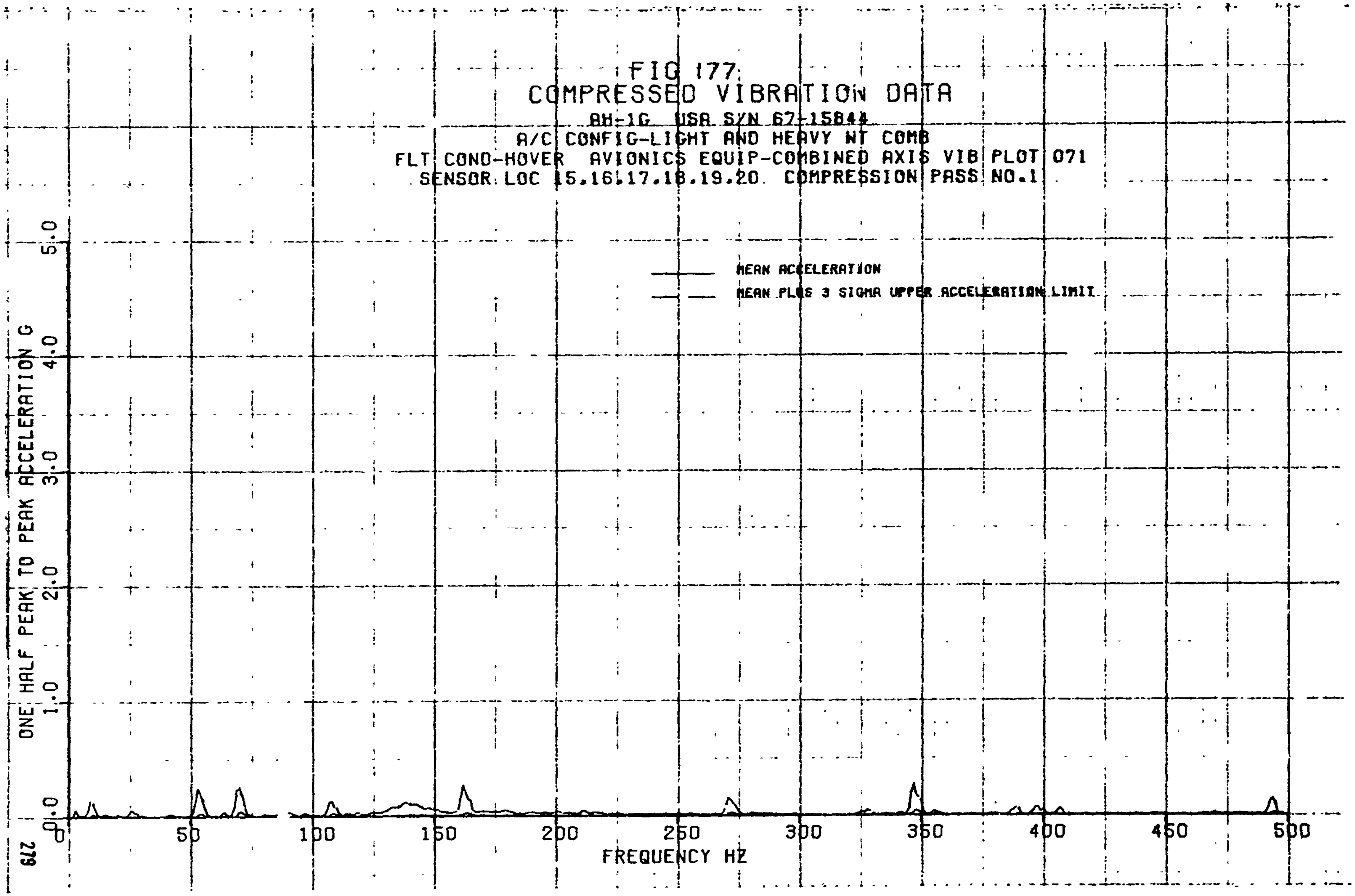
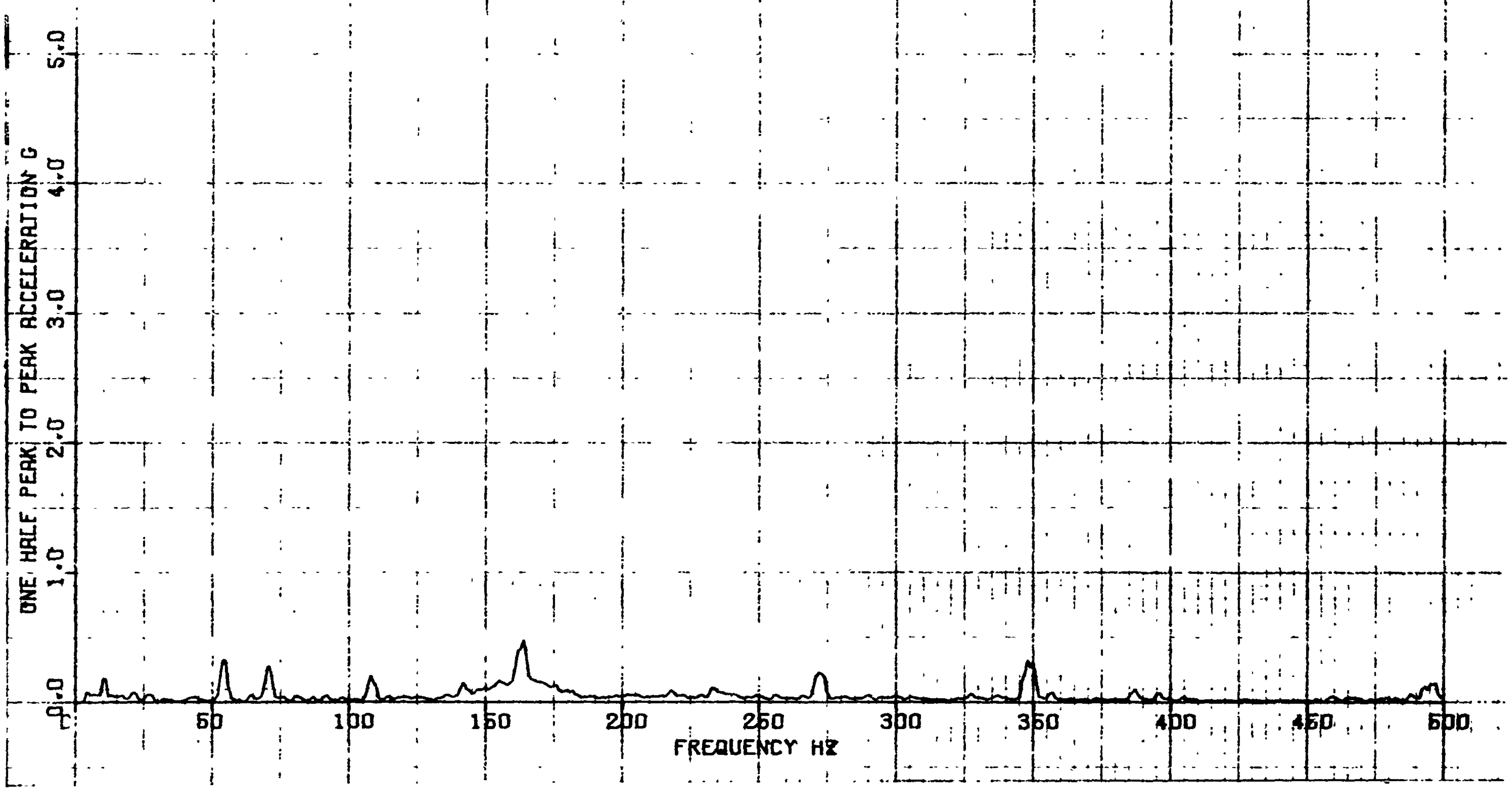


FIG 177
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-HOVER AVIONICS EQUIP-COMBINED AXIS VIB PLOT 071
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 178
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TRANS AVIONICS EQUIP-COMBINED AXIS VIB PLOT 072
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1



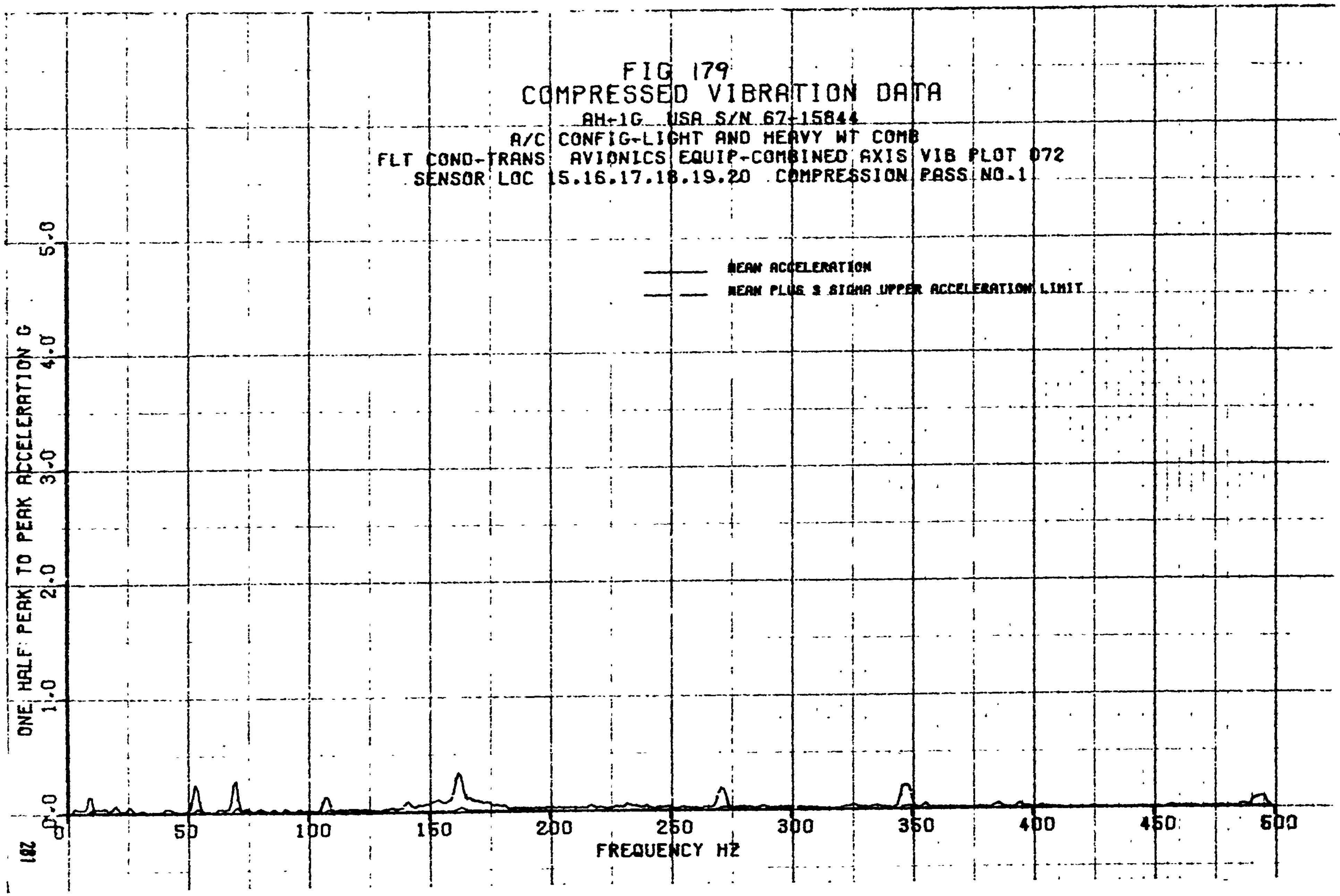


FIG 179
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TRANS AVIONICS EQUIP-COMBINED AXIS VIB PLOT 072
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 180

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-LEVEL FLT AVIONICS EQUIP-COMBINED AXIS VIB PLOT 073

SENSOR LOC 15,16,17,18,19,20 COMPRESSION PASS NO.1

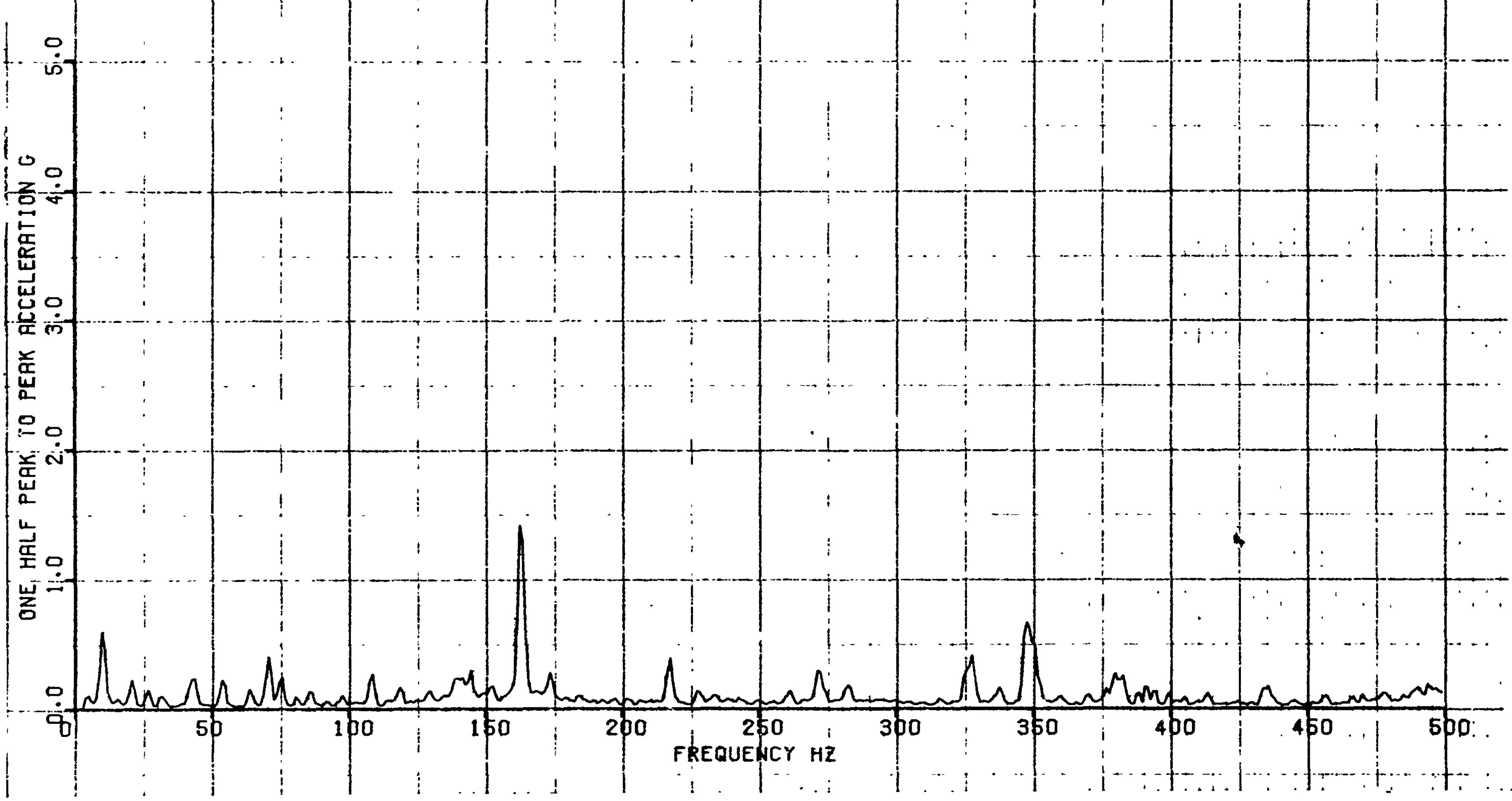


FIG 181

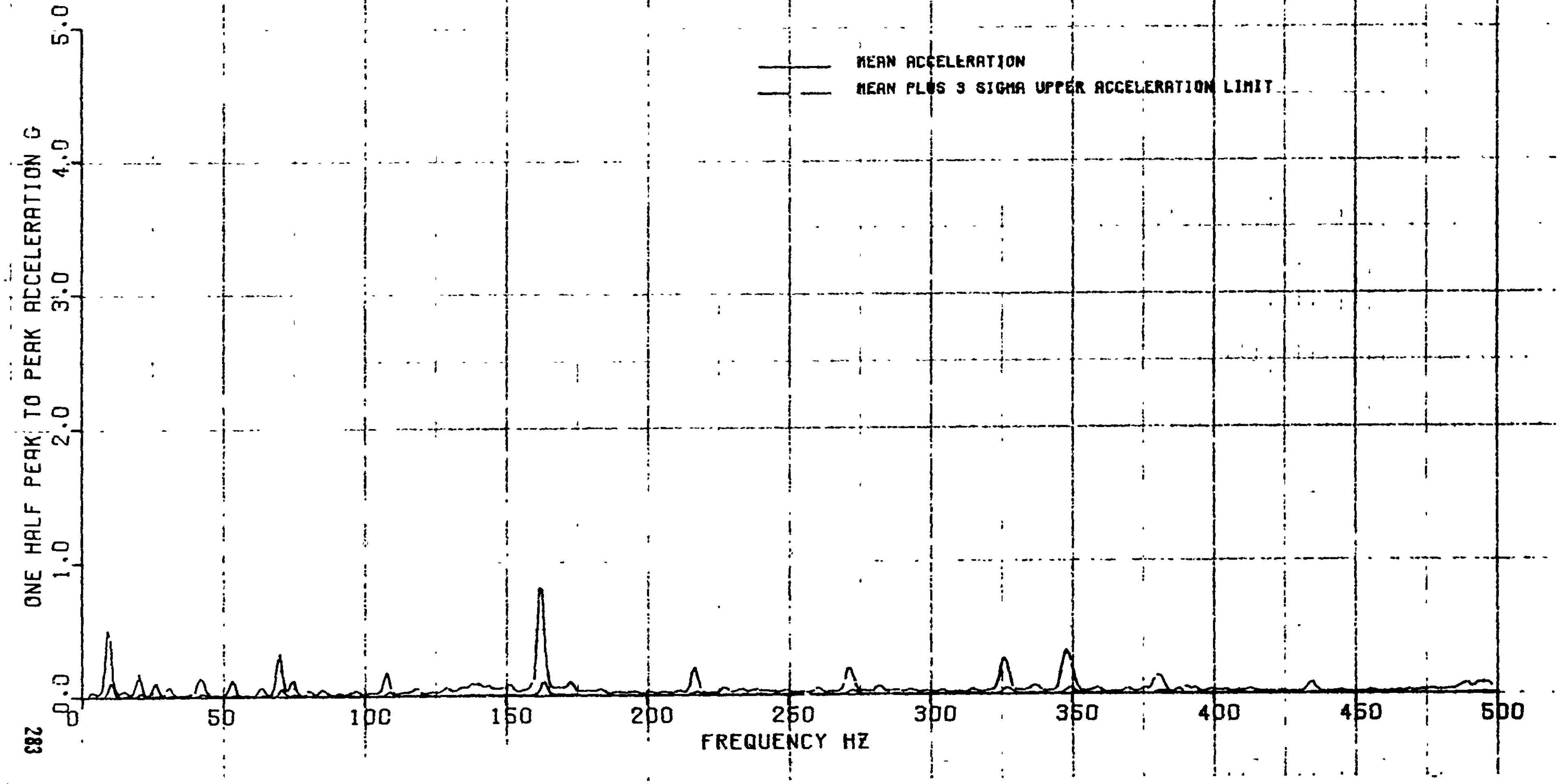
COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-LEVEL FLT AVIONICS EQUIP-COMBINED AXIS VIB PLOT 073

SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1



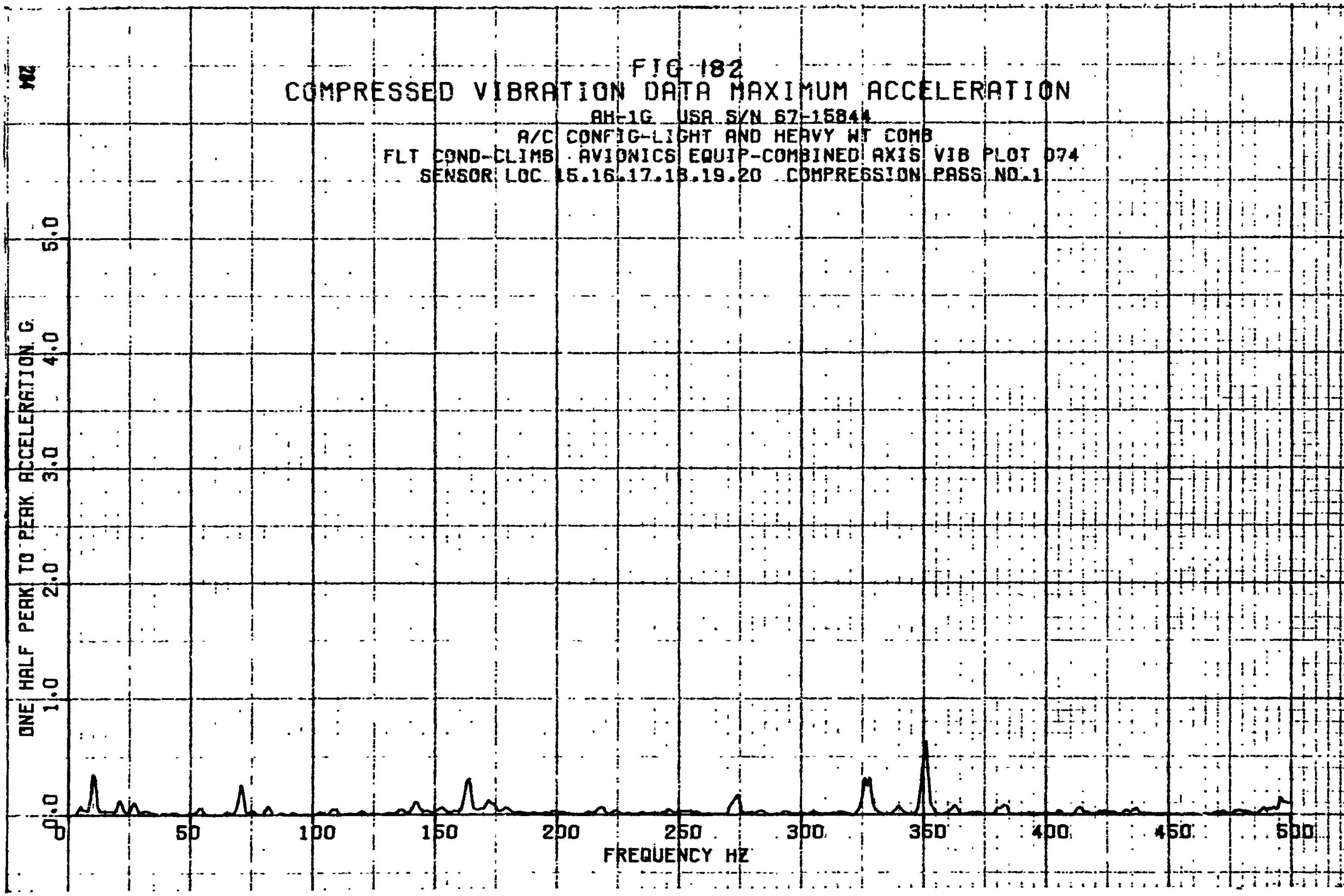


FIG 182
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-CLIMB AVIONICS EQUIP-COMBINED AXIS VIB PLOT 074
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1

FIG 183
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-CLIMB AVIONICS EQUIP-COMBINED AXIS VIB PLOT 074
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1

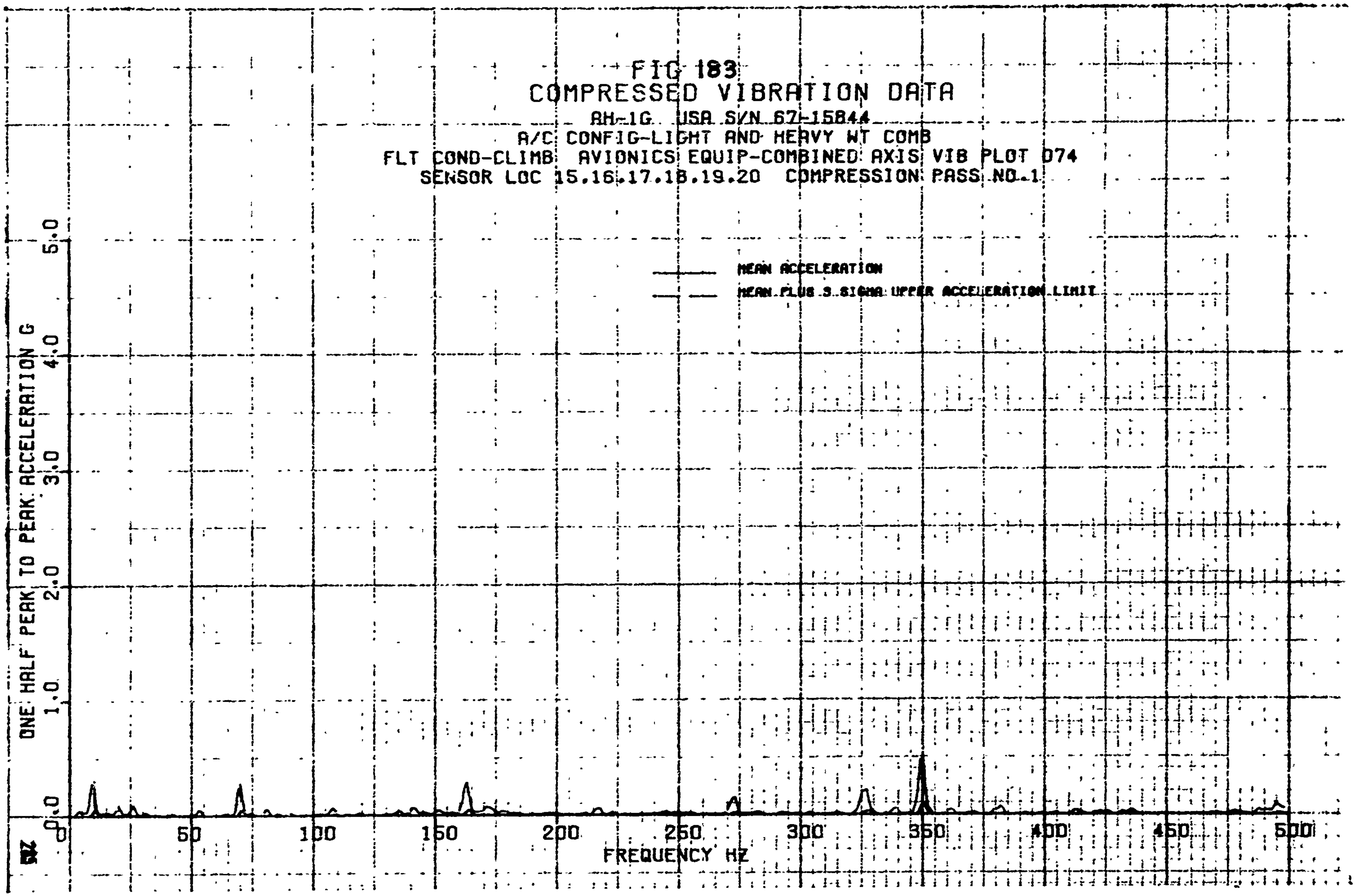
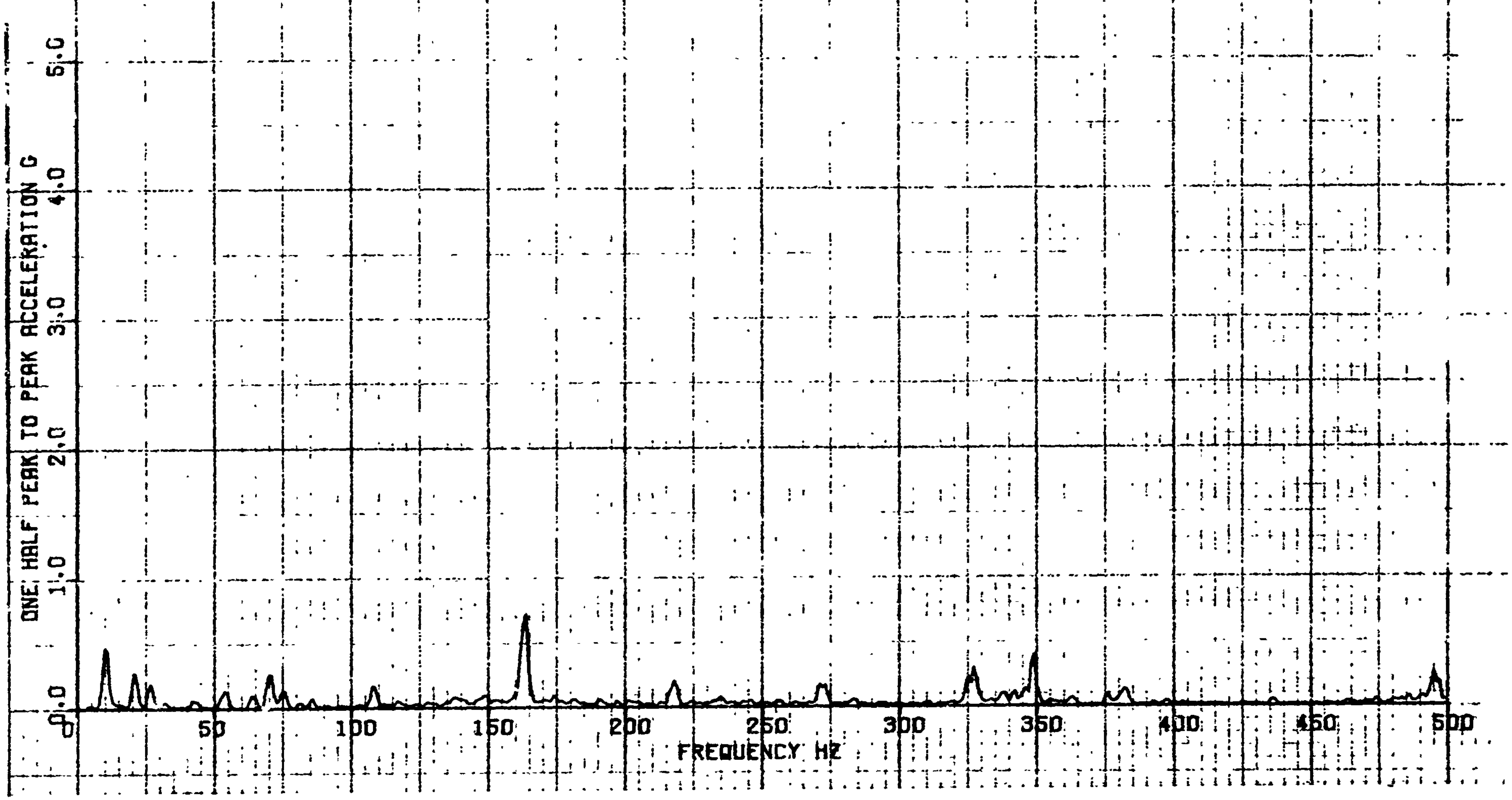


FIG 184
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-DESCENT AVIONICS EQUIP-COMBINED AXIS VIB PLOT 075
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1



302

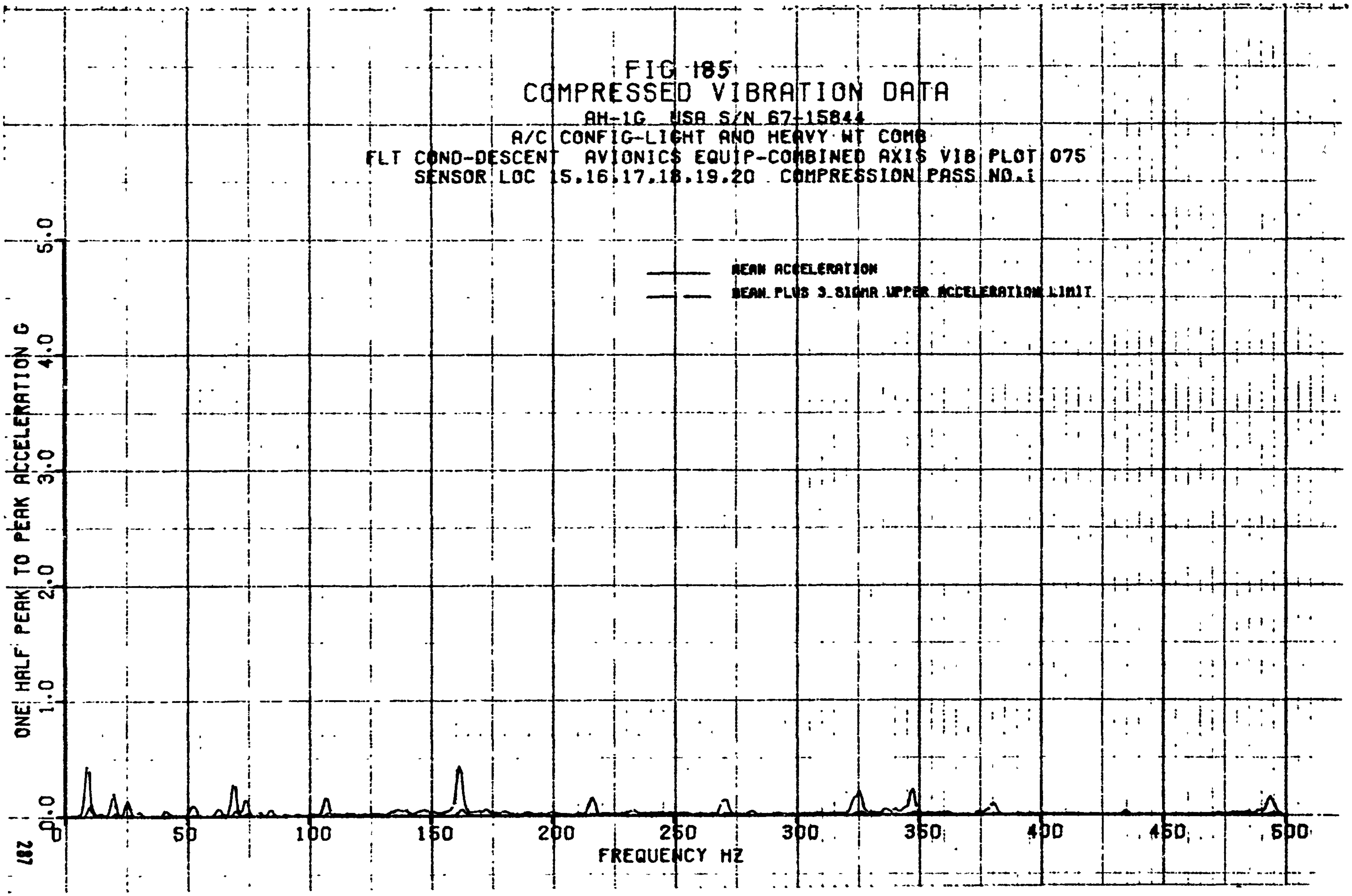


FIG 185
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-DESCENT AVIONICS EQUIP-COMBINED AXIS VIB PLOT 075
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

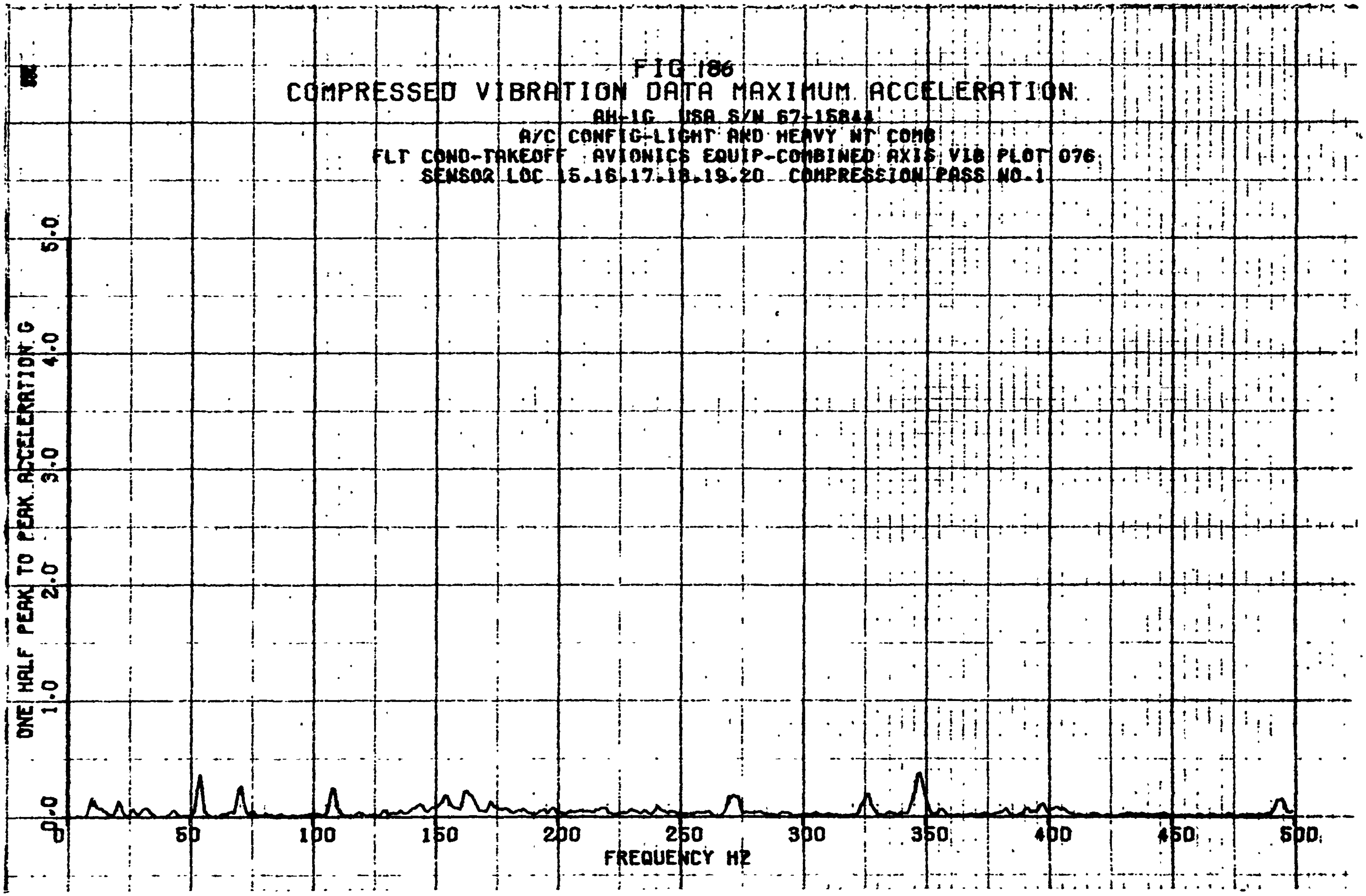


FIG 186
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TAKEOFF AVIONICS EQUIP-COMBINED AXIS VIB PLOT 076
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

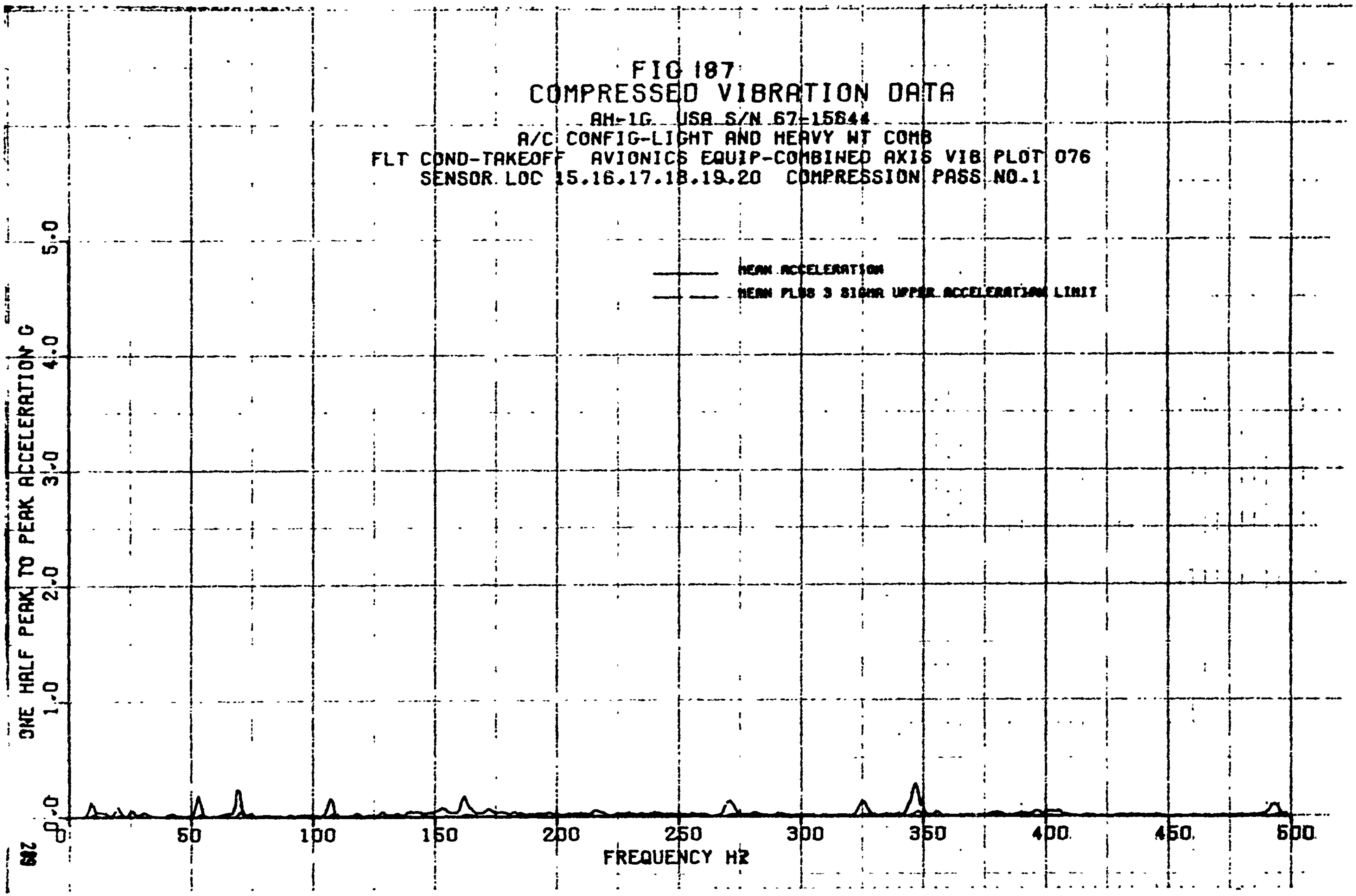
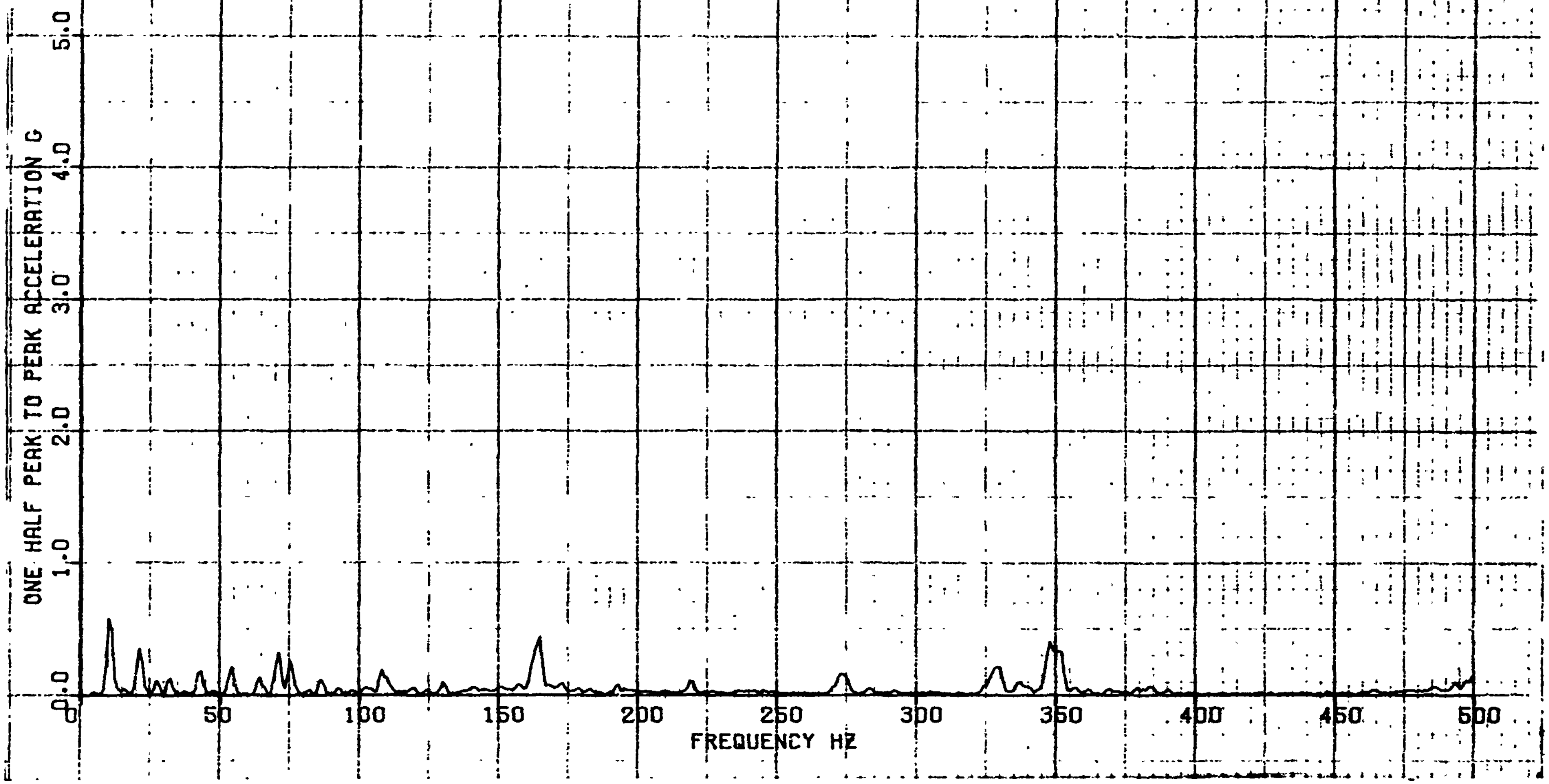


FIG 187
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15644
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TAKEOFF AVIONICS EQUIP-COMBINED AXIS VIB PLOT 076
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1

FIG 188
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LANDING AVIONICS EQUIP-COMBINED AXIS VIB PLOT 077
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1



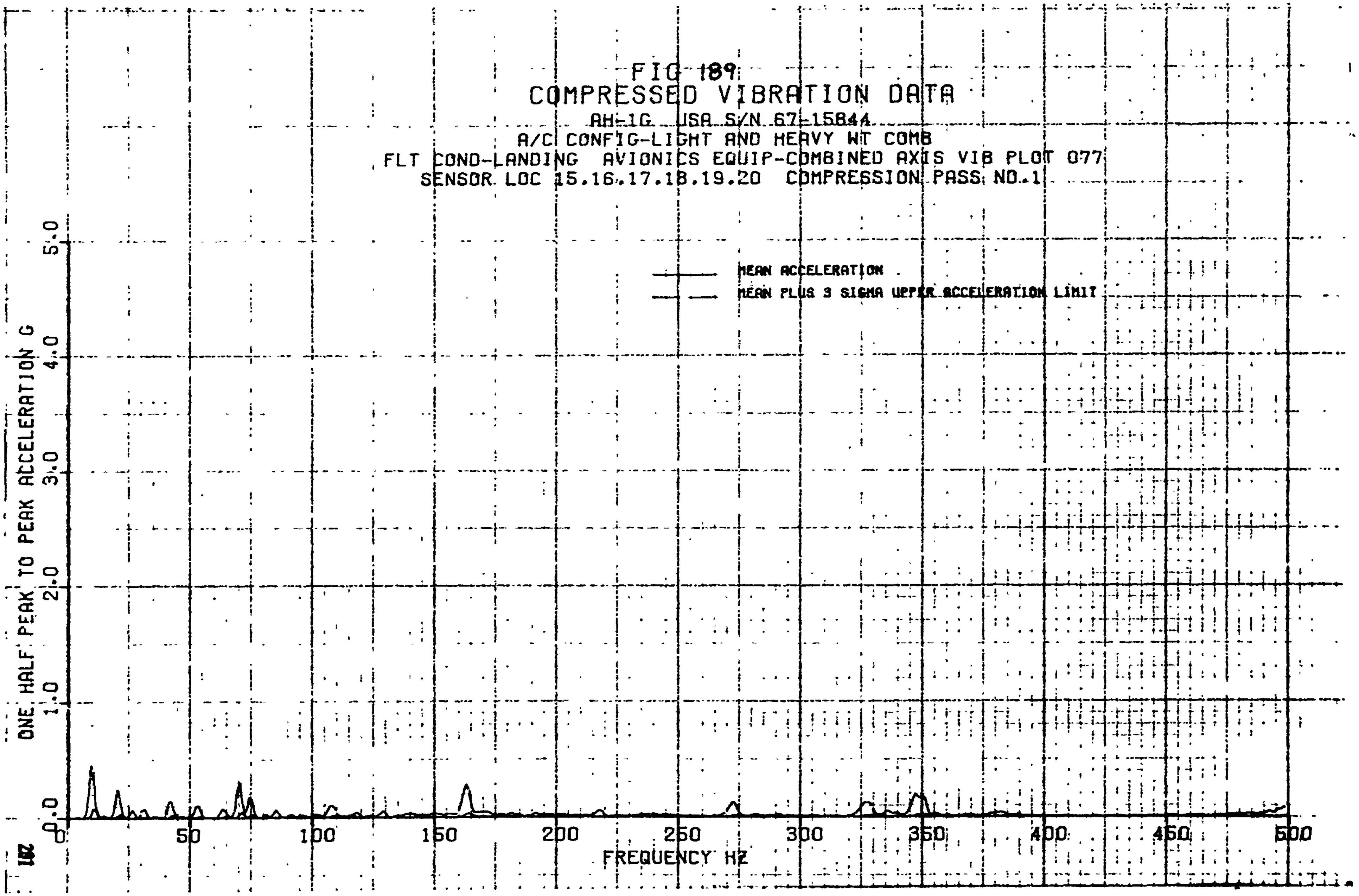


FIG 189
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LANDING AVIONICS EQUIP-COMBINED AXIS VIB PLOT 077
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 190

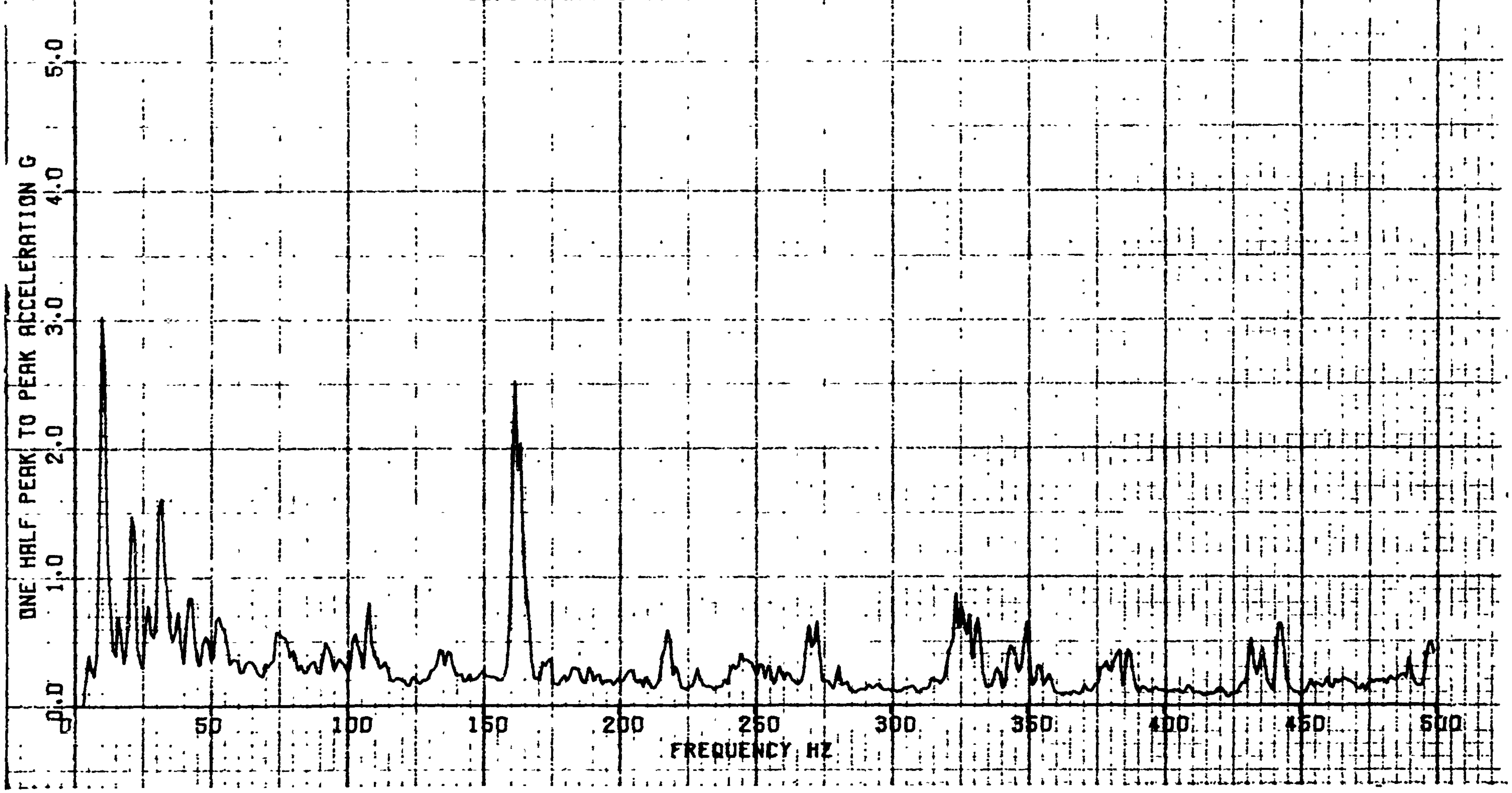
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-MANEUVERING AVIONICS EQUIP-COMBINED AXIS VIB PLOT 078

SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1



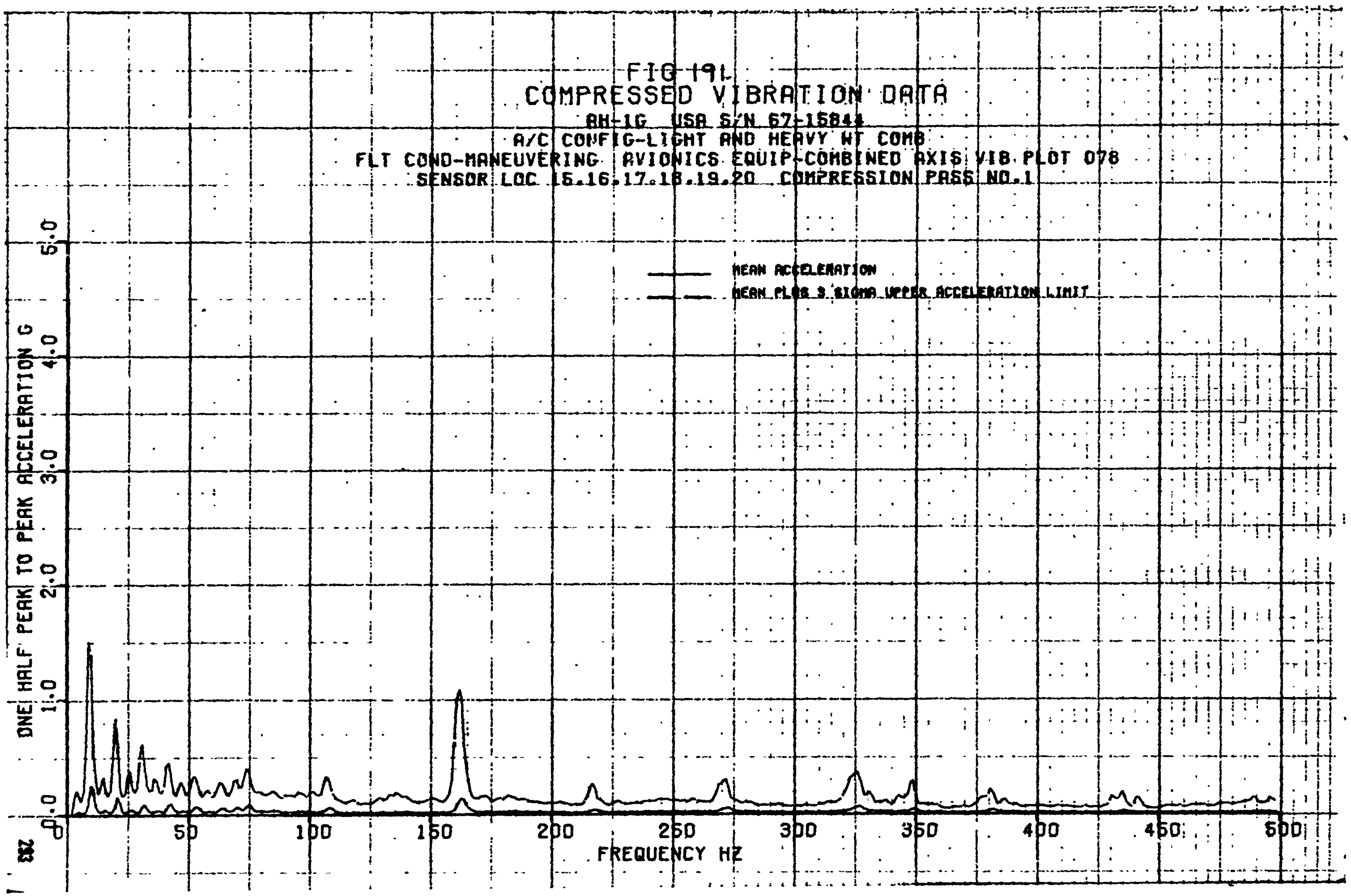


FIG 19L
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-MANEUVERING AVIONICS EQUIP-COMBINED AXIS VIB PLOT 078
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

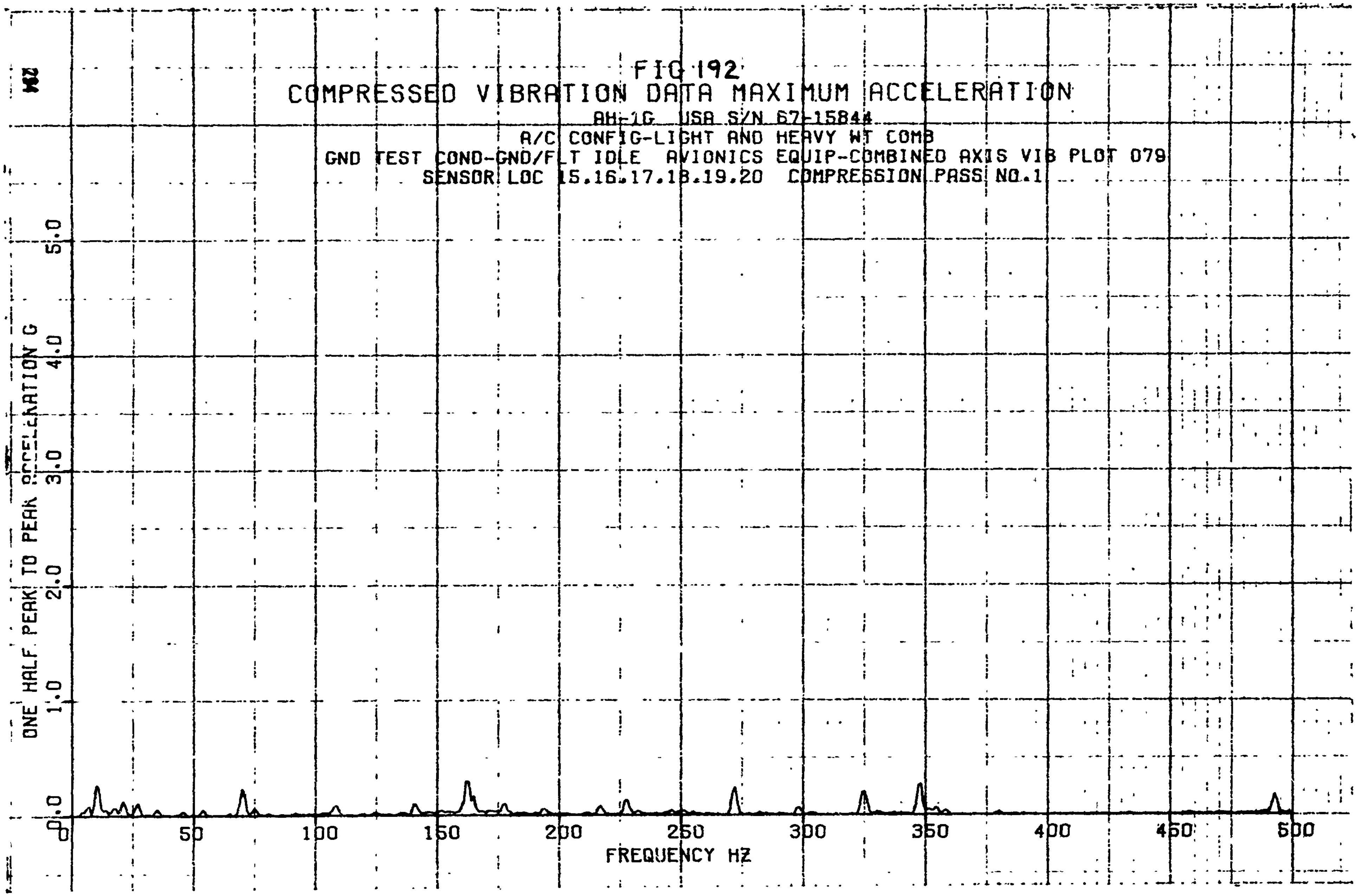


FIG 192
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
GND TEST COND-GND/FLT IDLE AVIONICS EQUIP-COMBINED AXIS VIB PLOT 079
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

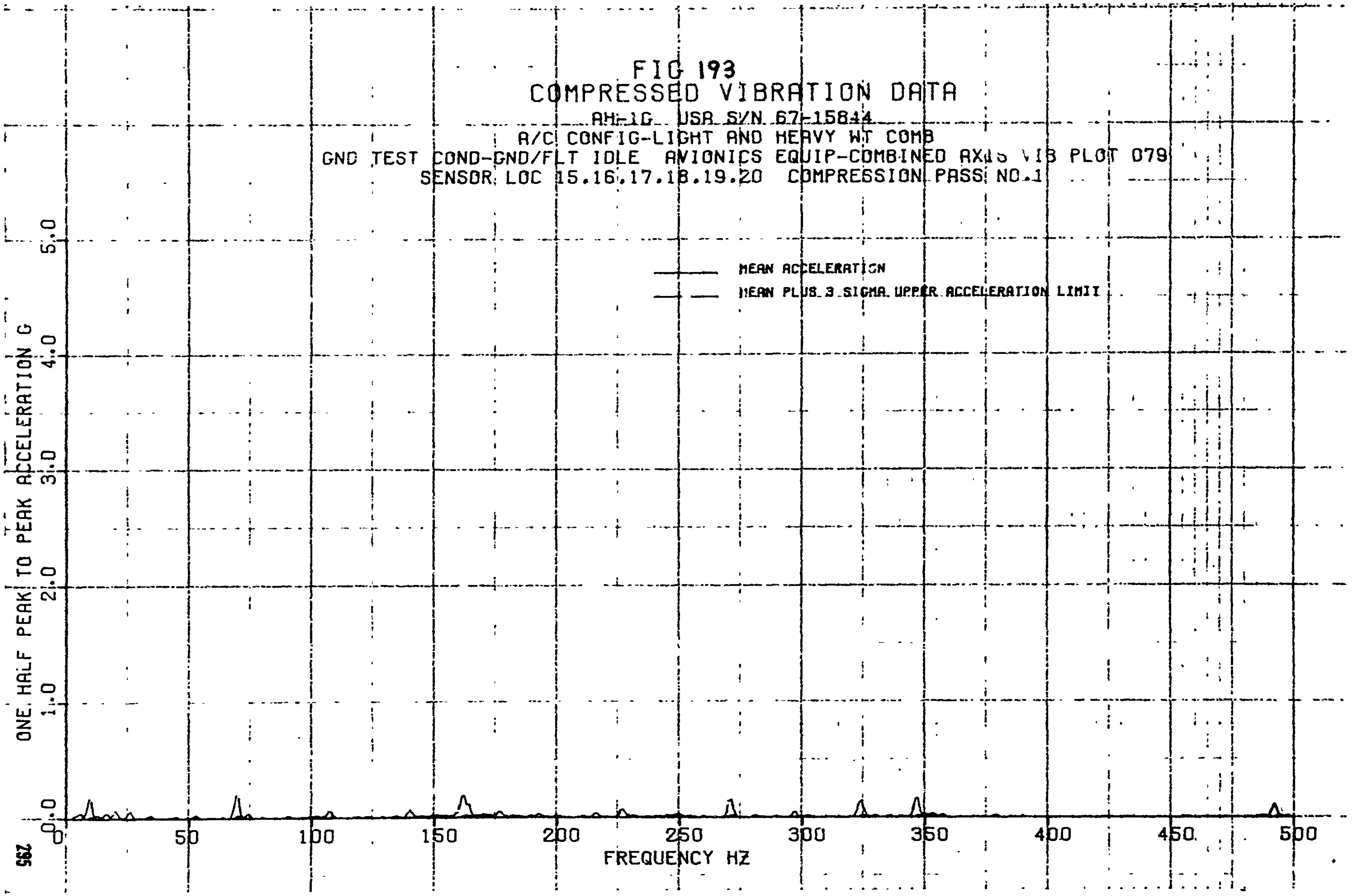
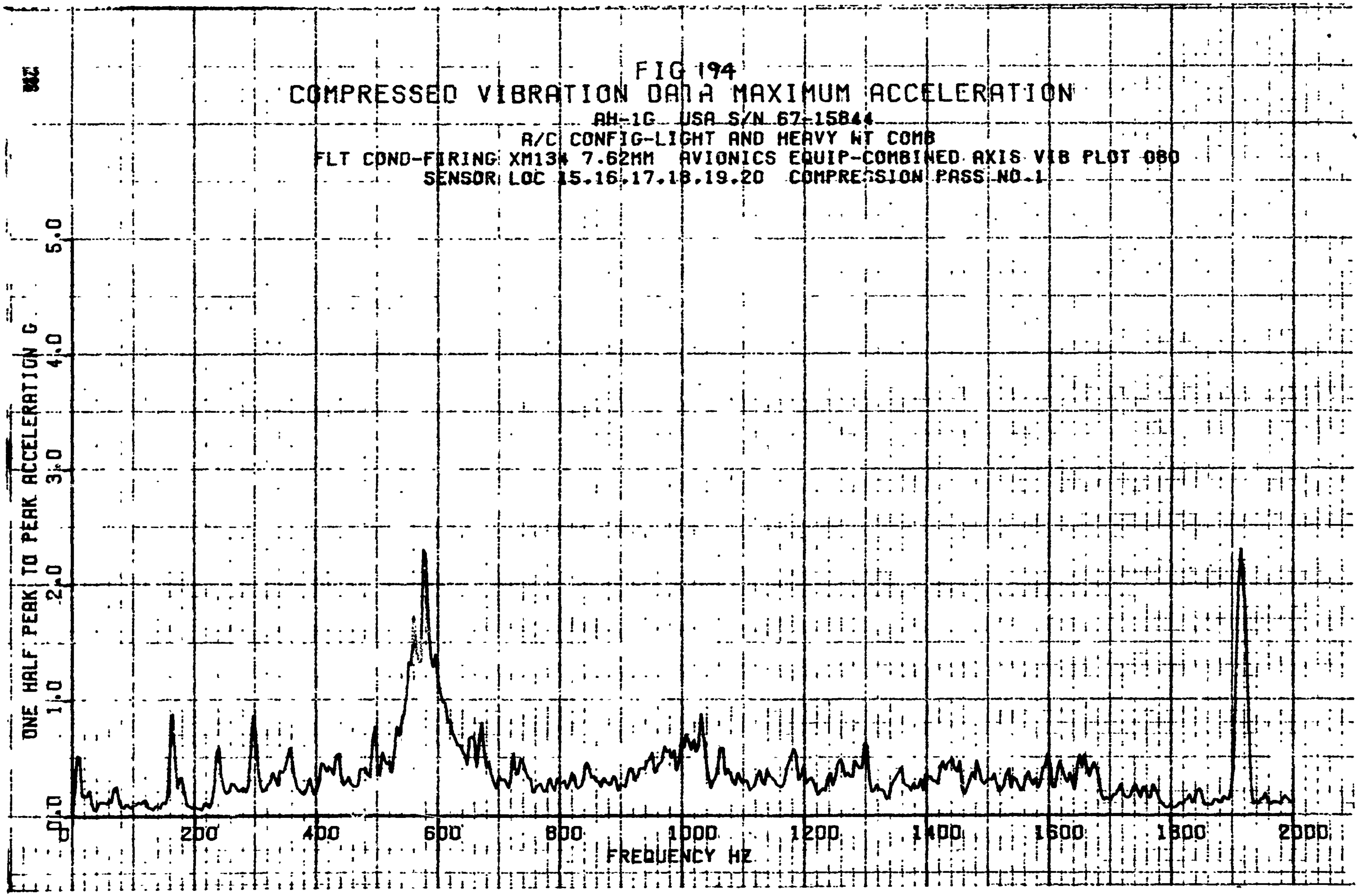


FIG 193
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
GND TEST COND-GND/FLT IDLE AVIONICS EQUIP-COMBINED AXIS VIB PLOT 079
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 194
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
R/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM134 7.62MM AVIONICS EQUIP-COMBINED AXIS VIB PLOT 080
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1



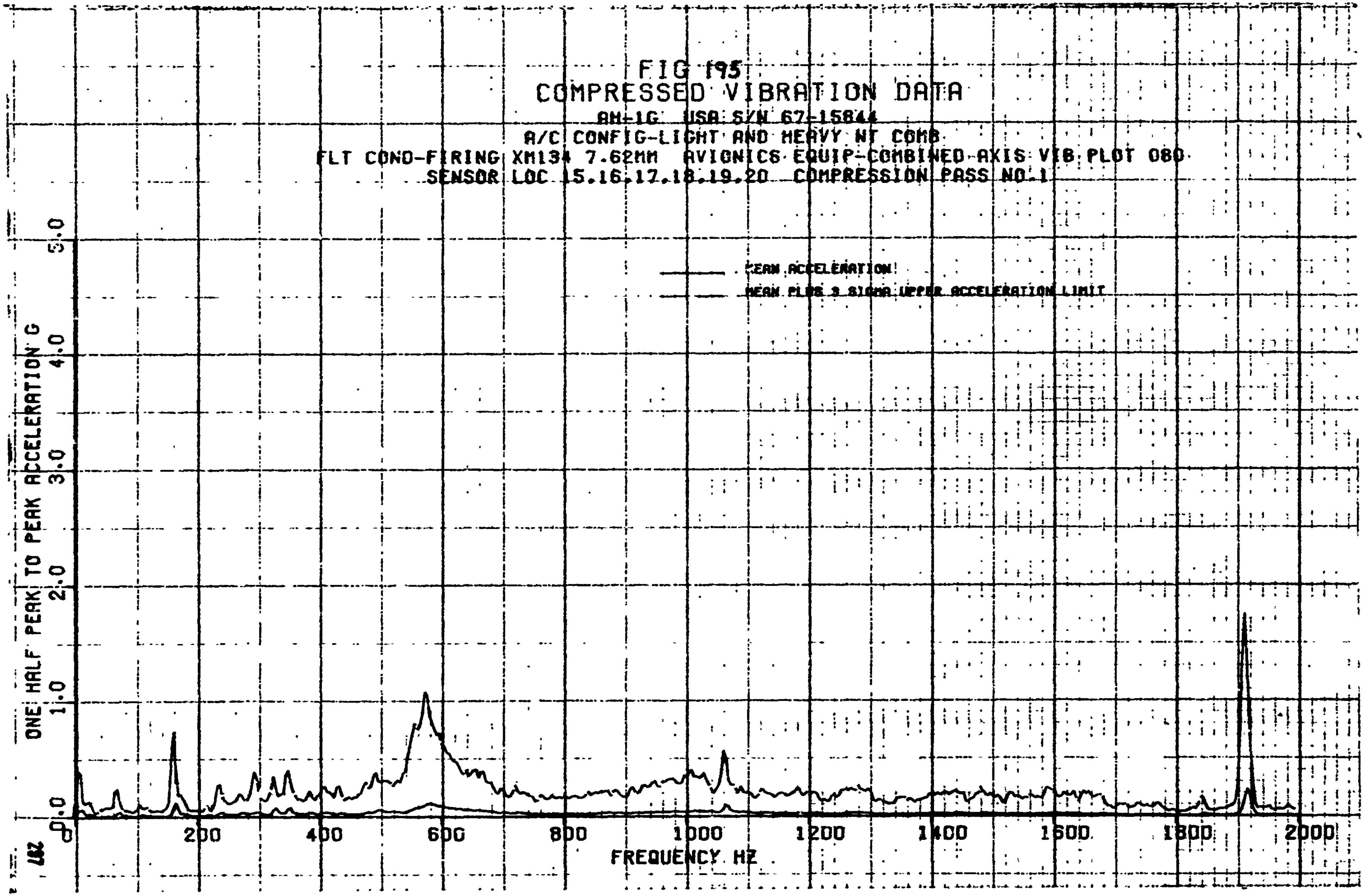


FIG 195
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY NT COMB
FLT COND-FIRING XM134 7.62MM AVIONICS EQUIP-COMBINED AXIS VIB PLOT 080
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO 1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

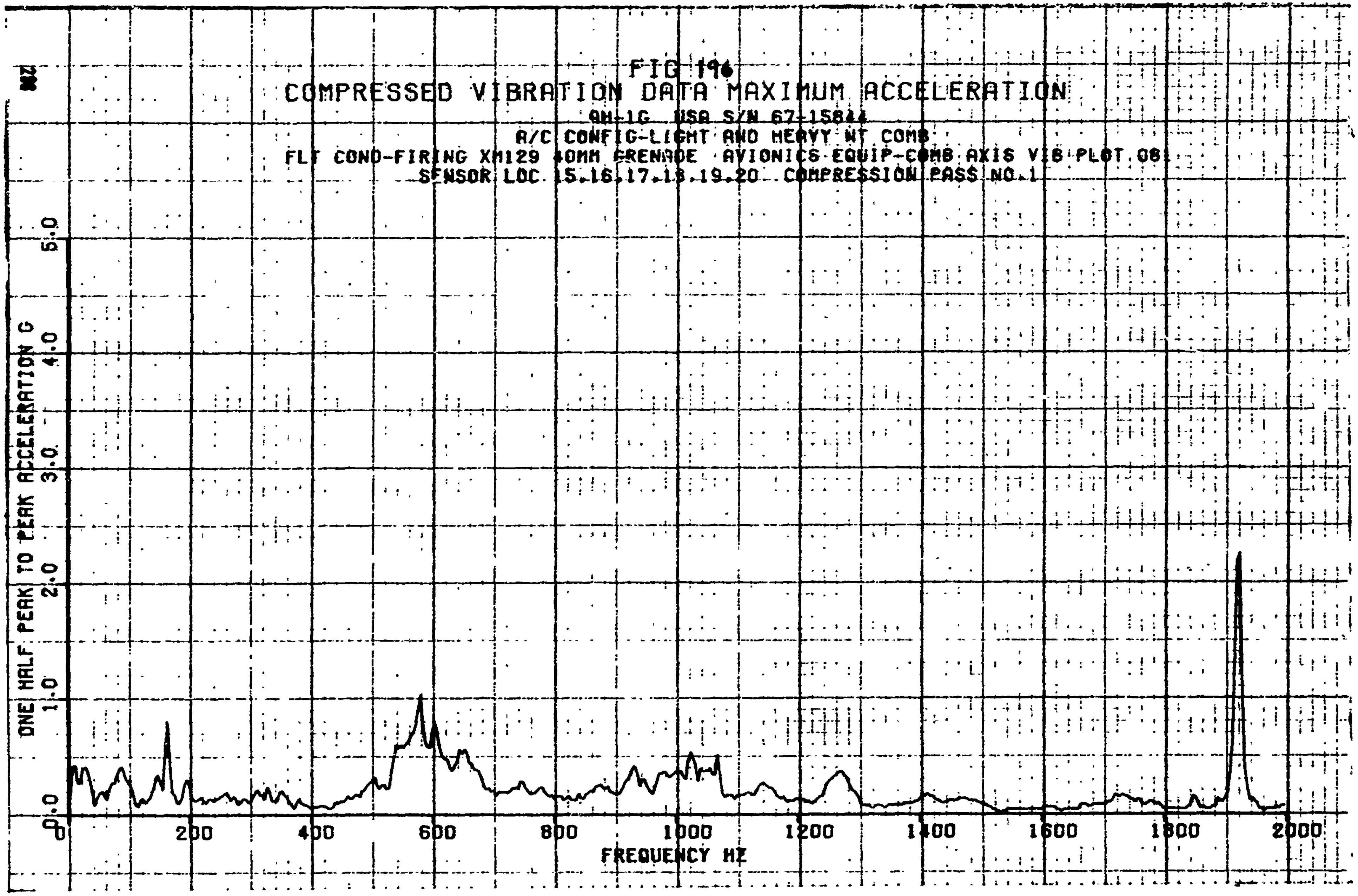


FIG 196
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM129 40MM GRENADE AVIONICS EQUIP-COMB AXIS VIB PLOT 08
SENSOR LOC 15,16,17,18,19,20 COMPRESSION PASS NO.1

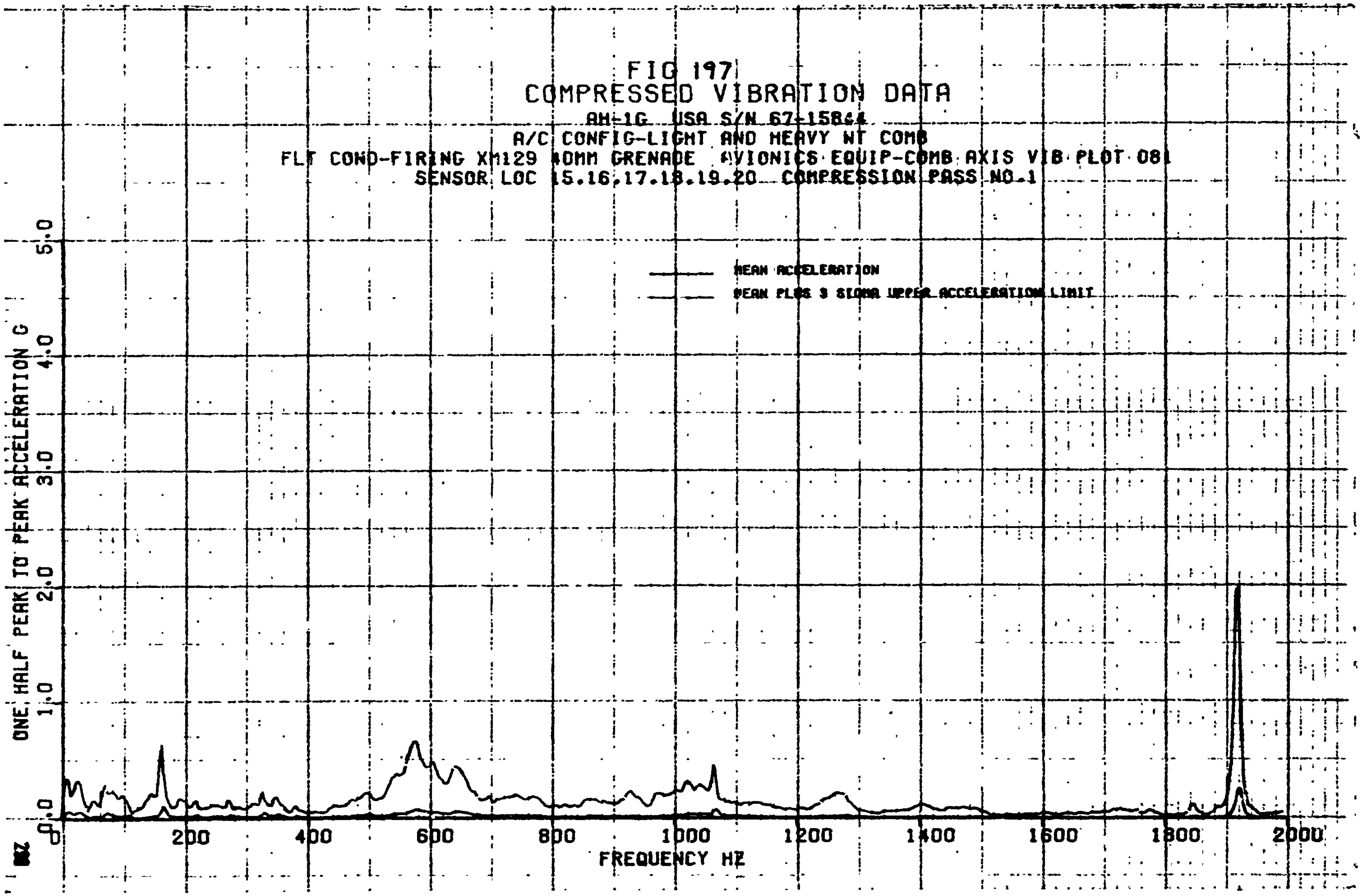


FIG 197
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM129 40MM GRENADE AVIONICS EQUIP-COMB AXIS VIB PLOT 081
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1

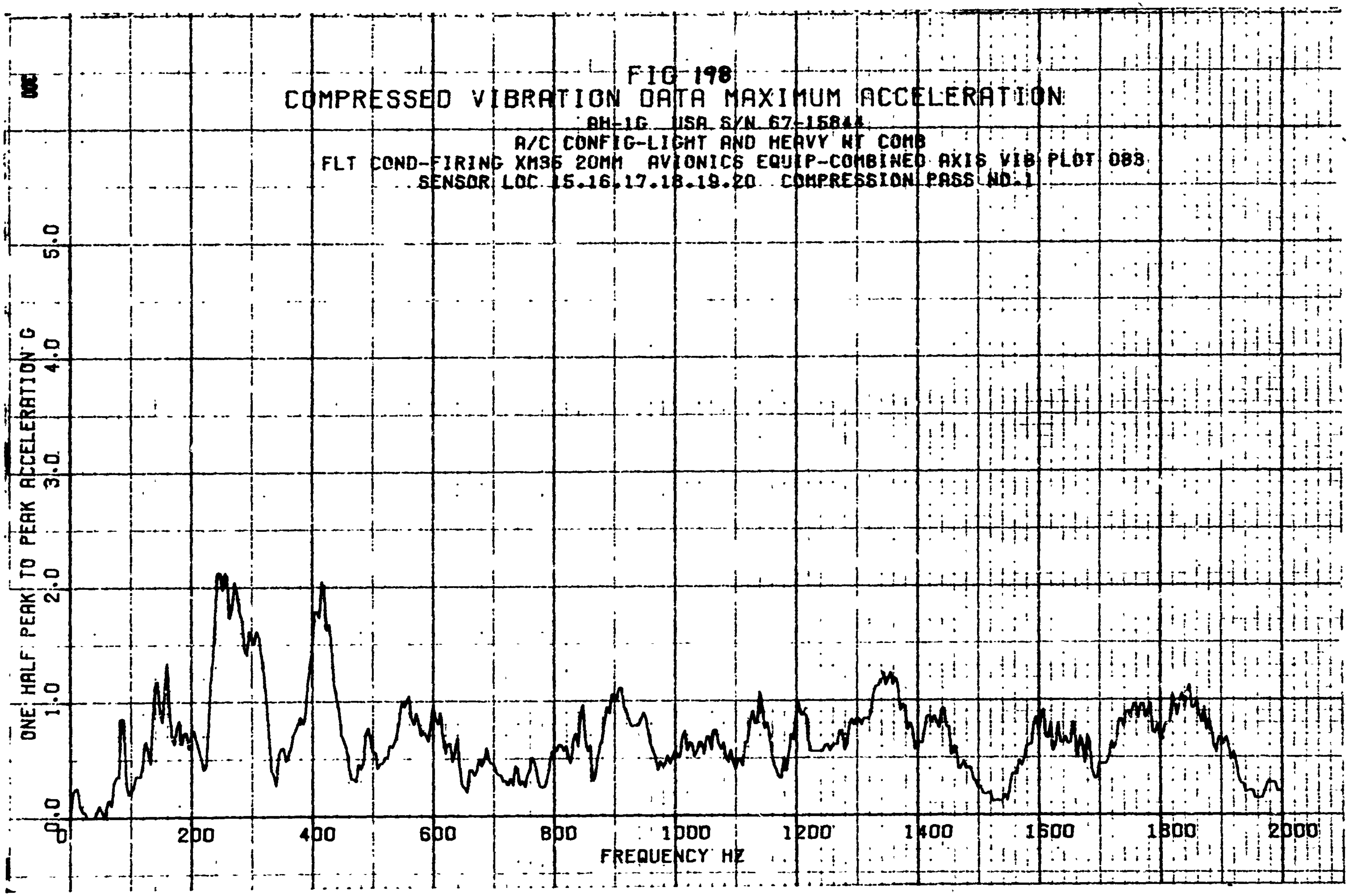


FIG 198
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM35 20MM AVIONICS EQUIP-COMBINED AXIS VIB PLOT 083
SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1

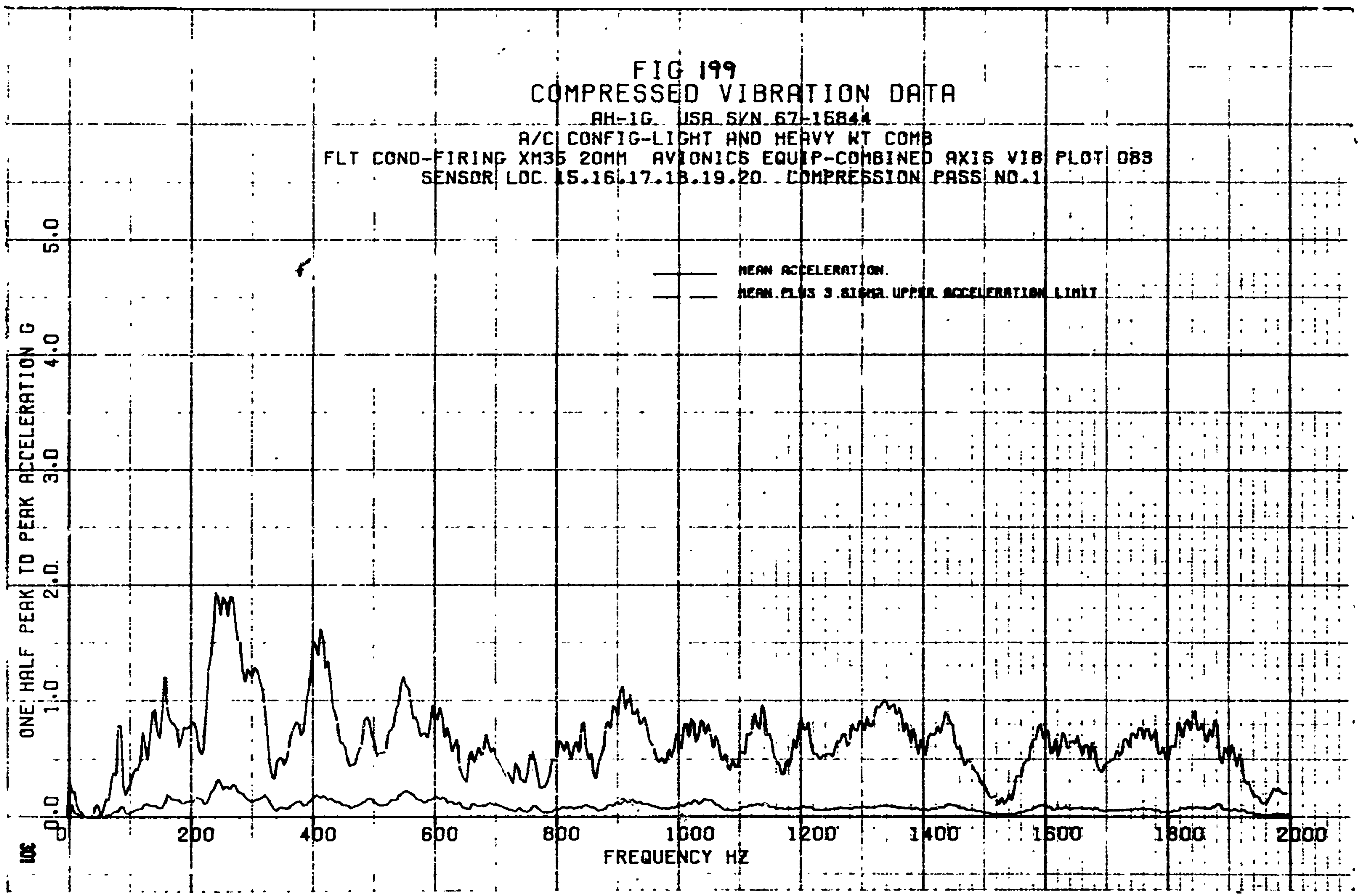


FIG 199
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM35 20MM AVIONICS EQUIP-COMBINED AXIS VIB PLOT 083
SENSOR LOC. 15.16.17.18.19.20. COMPRESSION PASS NO.1
MEAN ACCELERATION.
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

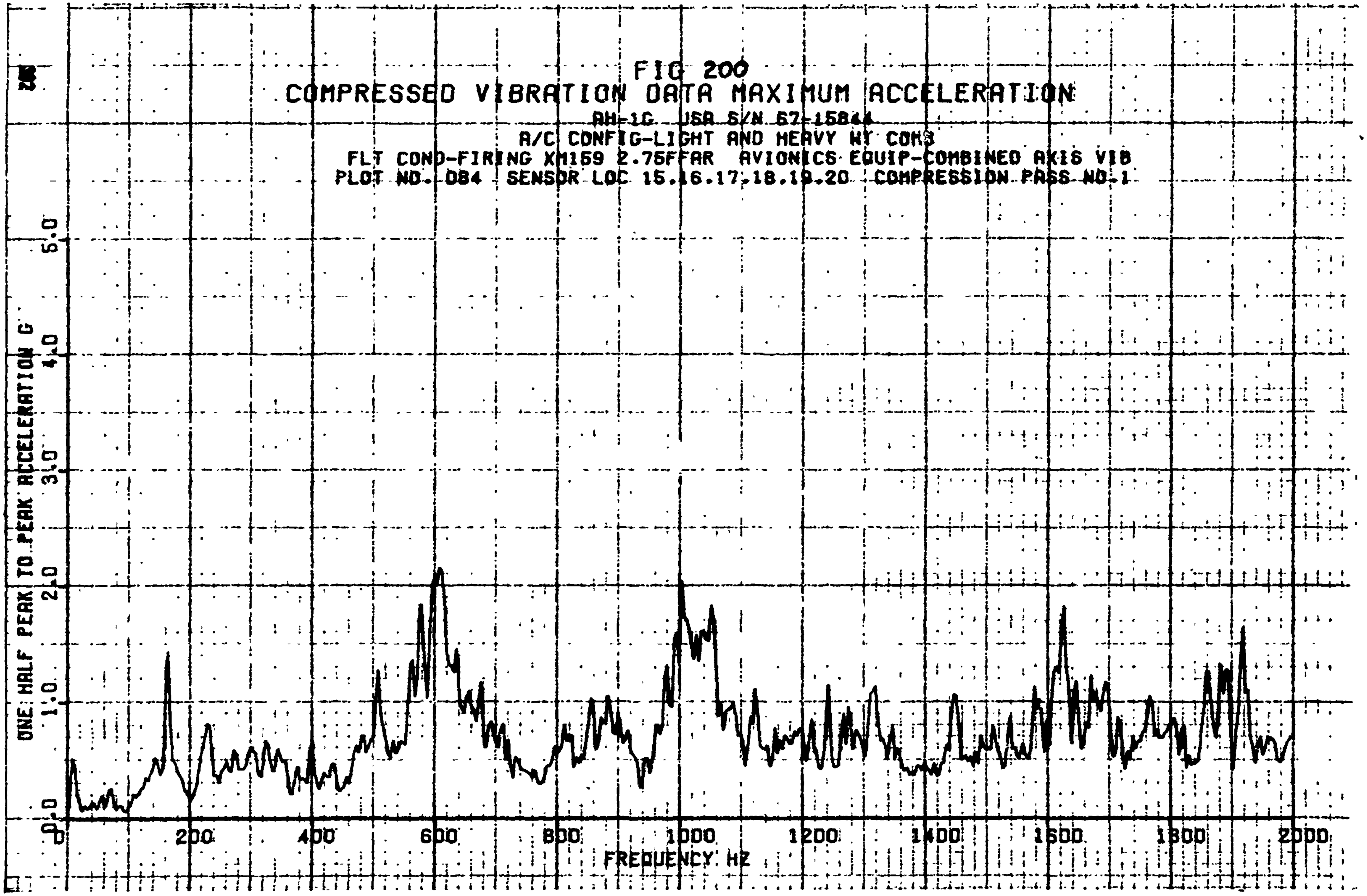


FIG 200
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM159 2.75FFAR AVIONICS EQUIP-COMBINED AXIS VIB
PLOT NO. DB4 SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
1.0
2.0
3.0
4.0
5.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 201

COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-FIRING XM159 2.75FFAR AVIONICS EQUIP-COMBINED AXIS VIB

PLOT NO. 084 SENSOR LOC 15.16.17.18.19.20 COMPRESSION PASS NO.1

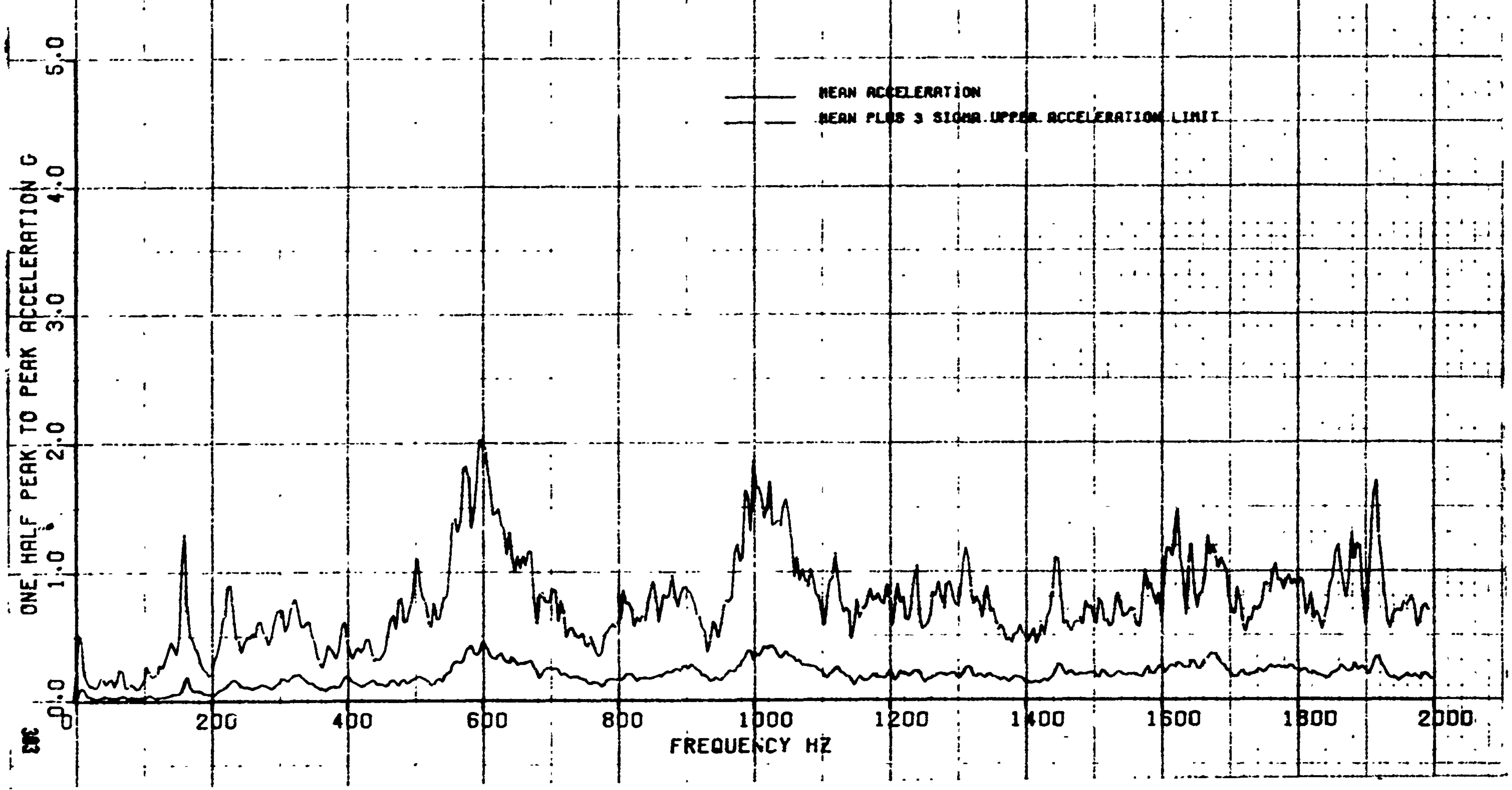


FIG 202

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15848

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-HOVER PILOT INPUT-COMBINED AXIS VIB PLOT 099

SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1

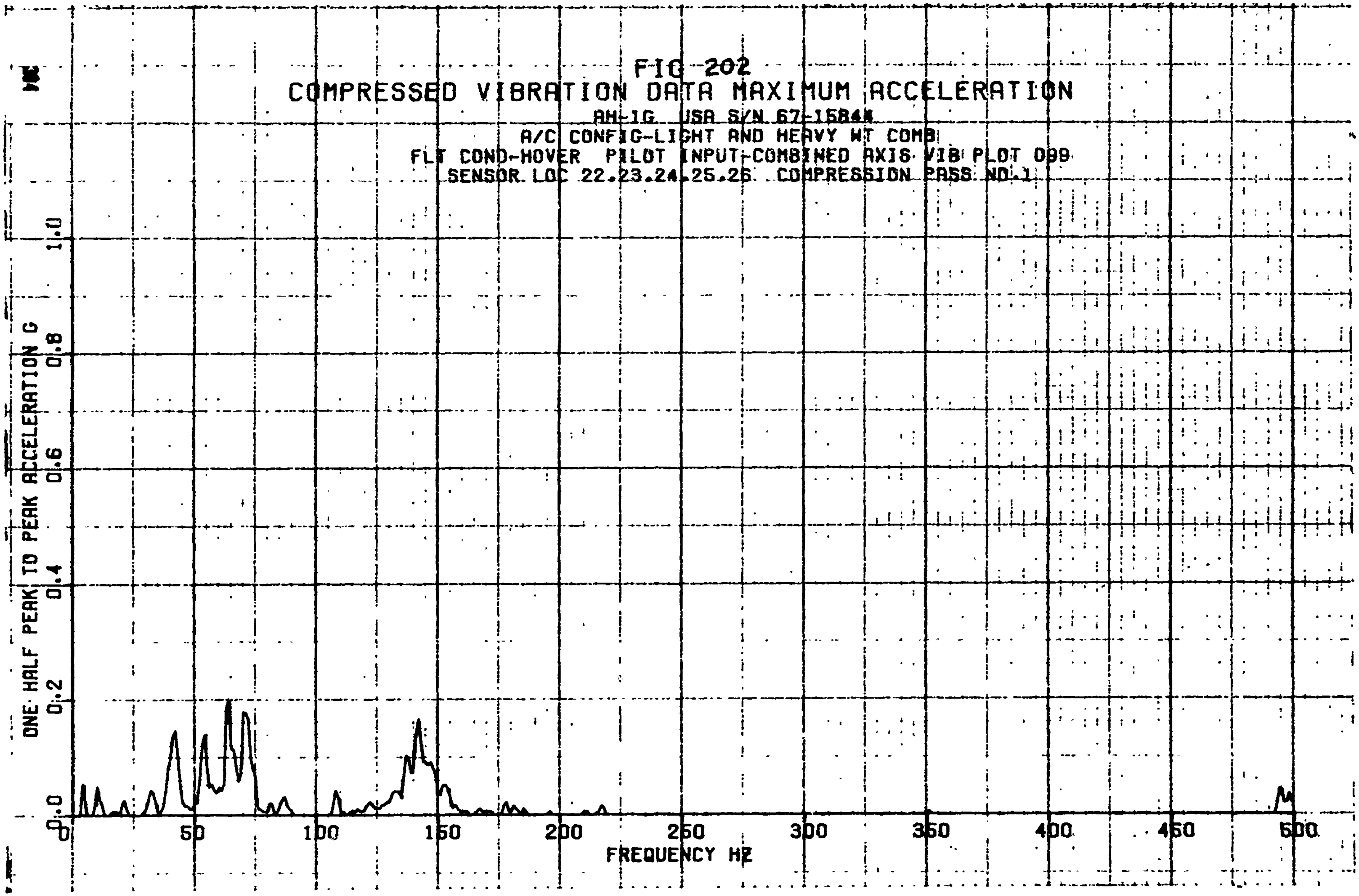


FIG 203
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-HOVER PILOT INPUT-COMBINED AXIS VIB PLOT 099
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1

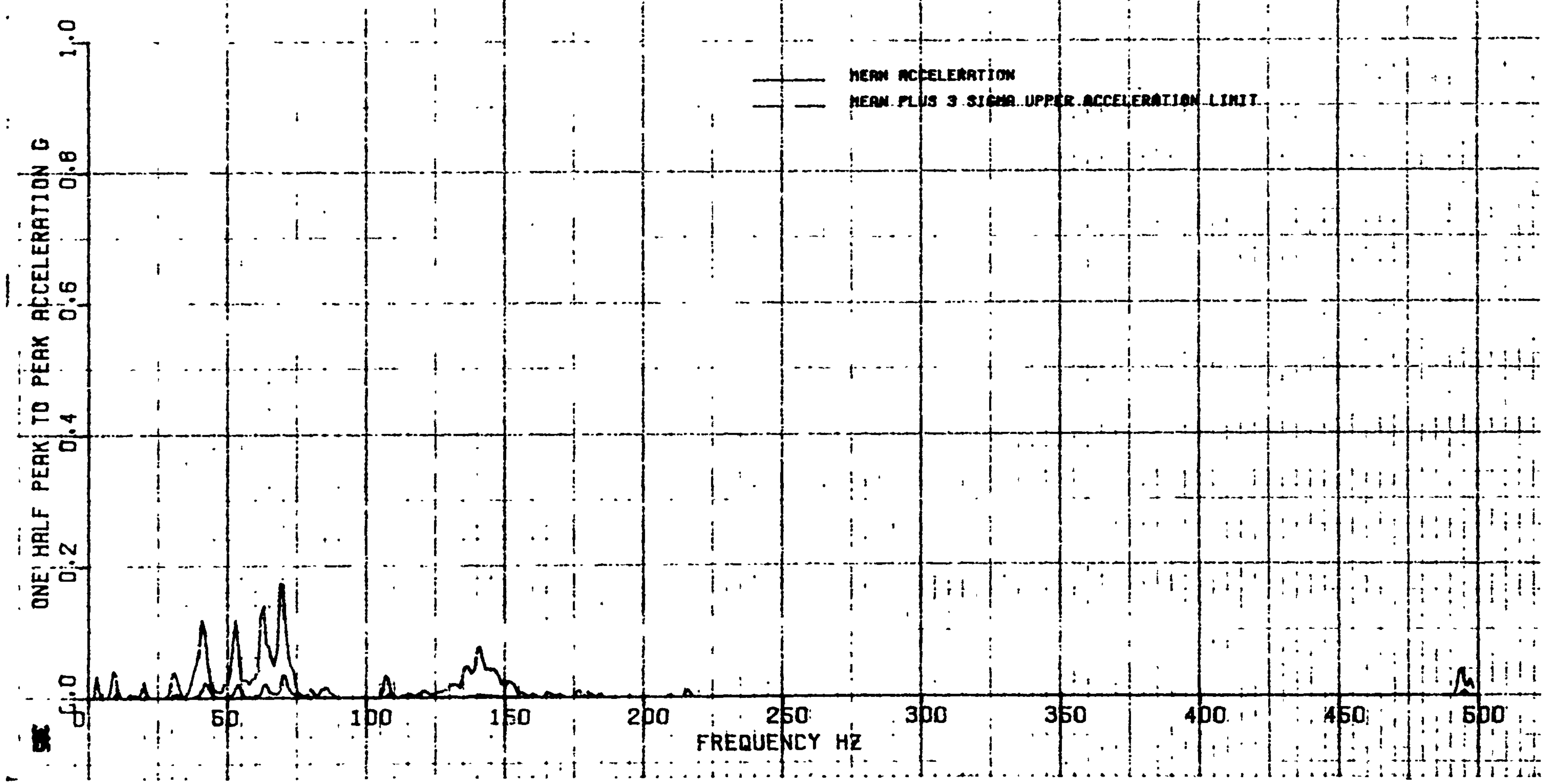
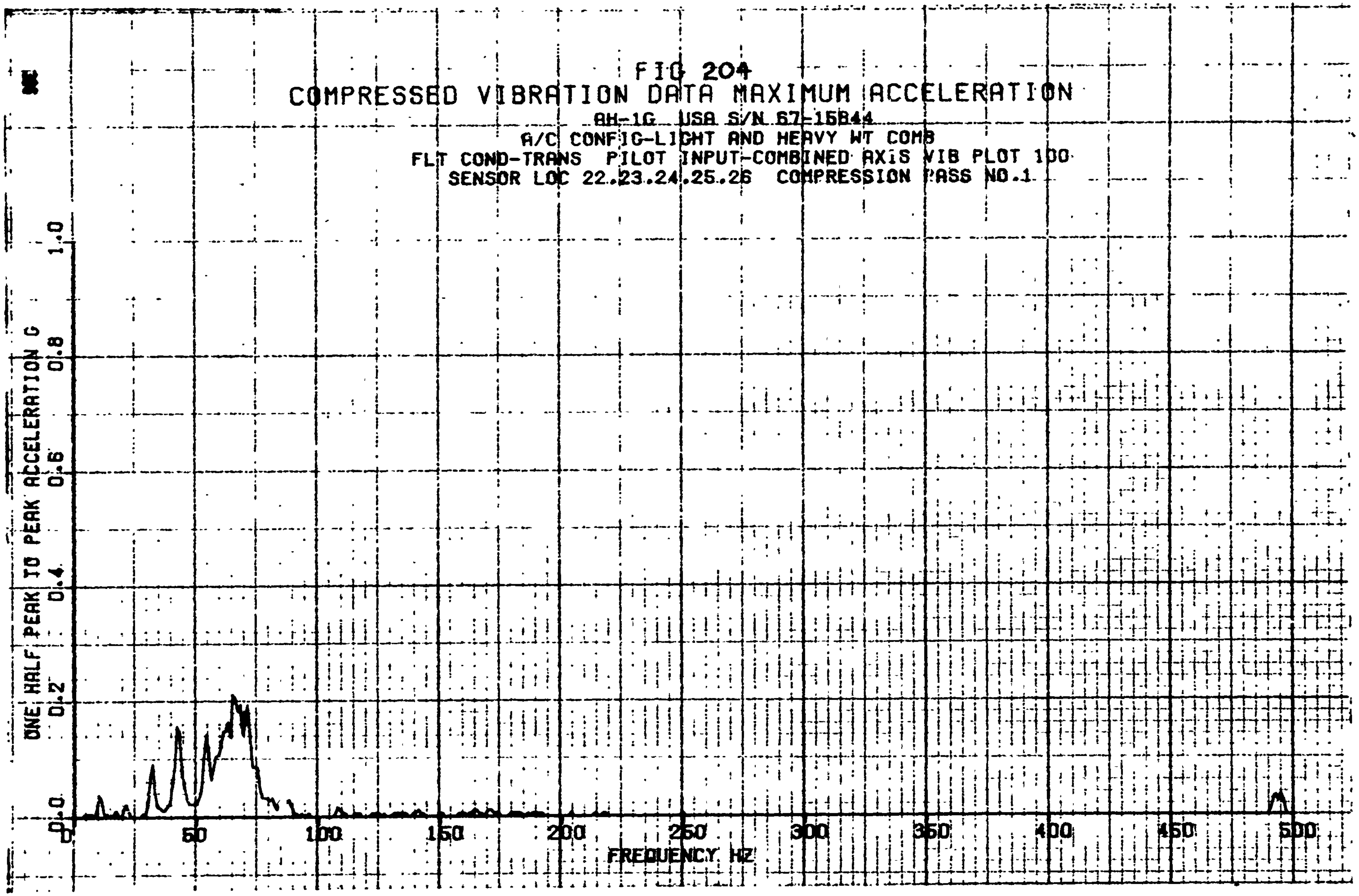


FIG 204
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TRANS PILOT INPUT-COMBINED AXIS VIB PLOT 100
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1



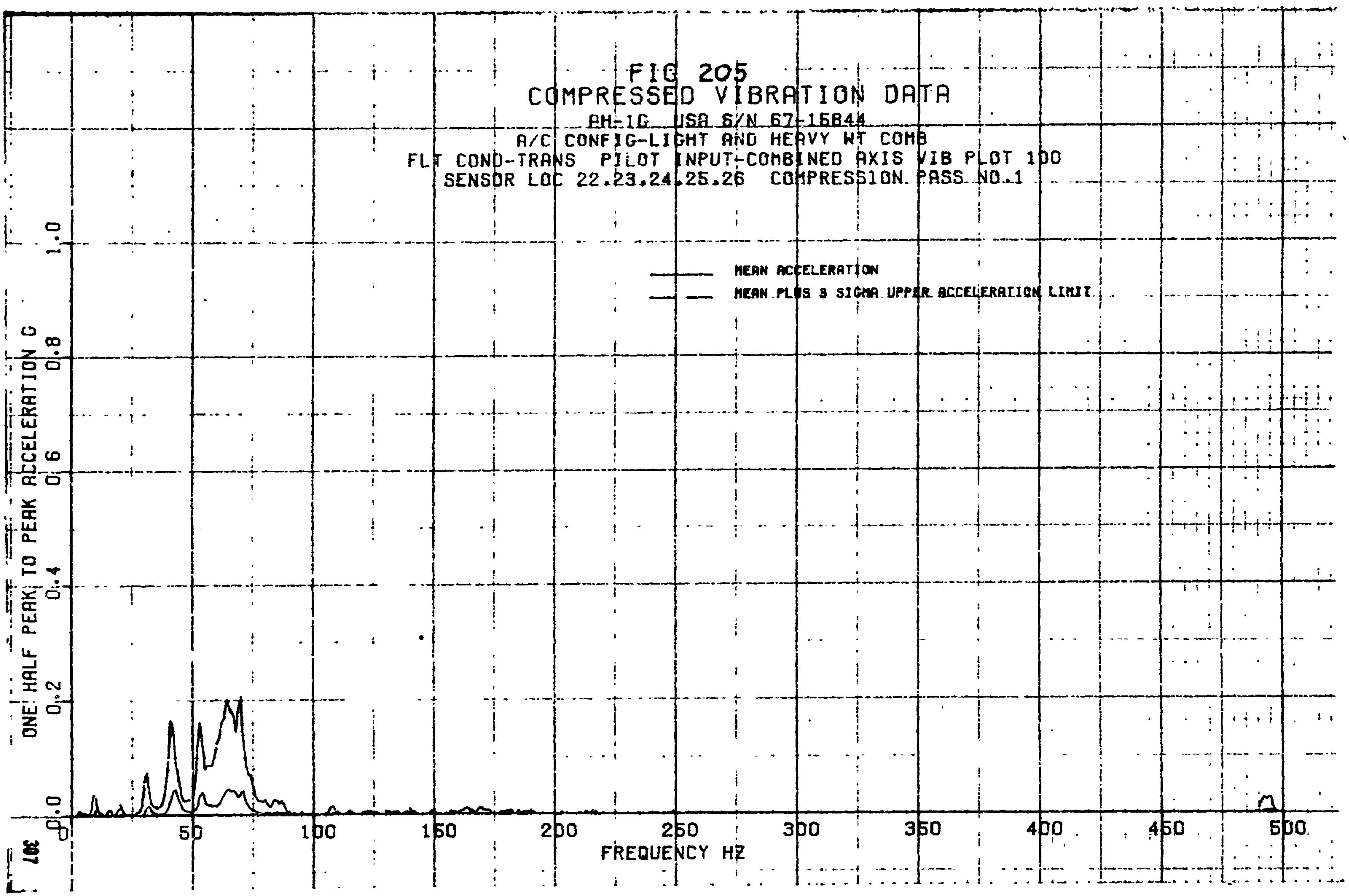


FIG 205
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TRANS PILOT INPUT-COMBINED AXIS VIB PLOT 100
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1

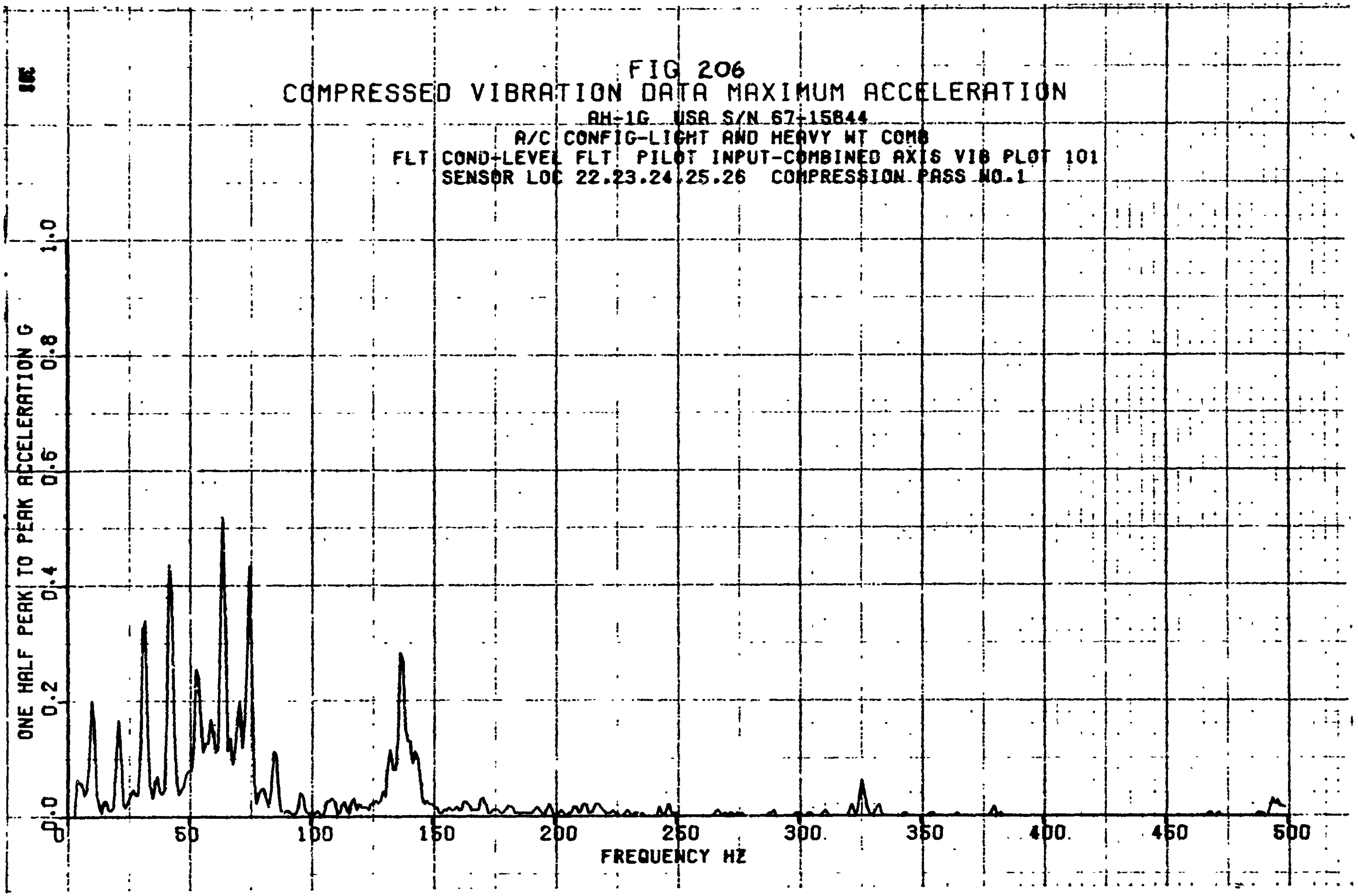


FIG 206
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LEVEL FLT PILOT INPUT-COMBINED AXIS VIB PLOT 101
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1

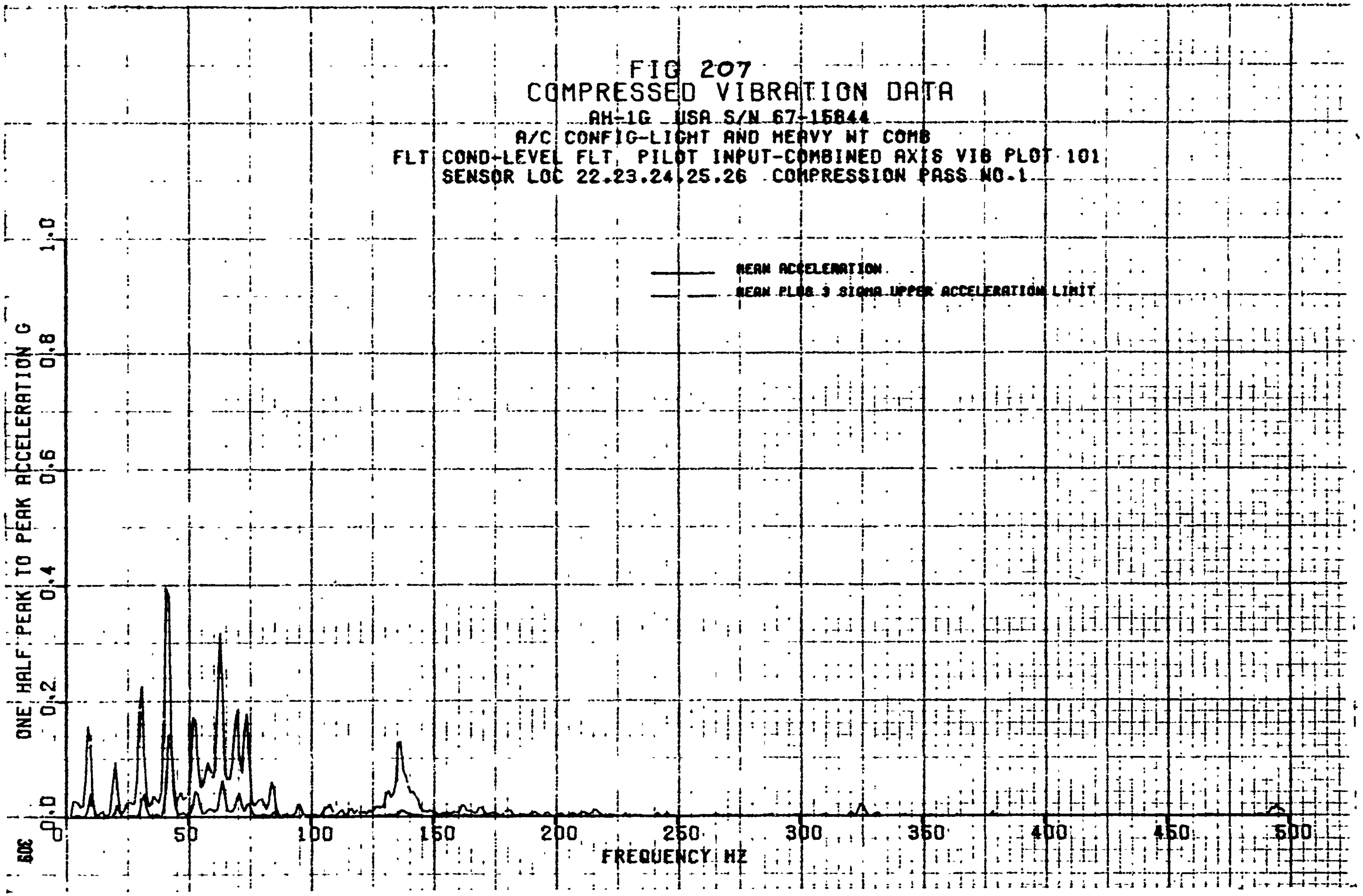


FIG 207
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LEVEL FLT, PILOT INPUT-COMBINED AXIS VIB PLOT 101
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

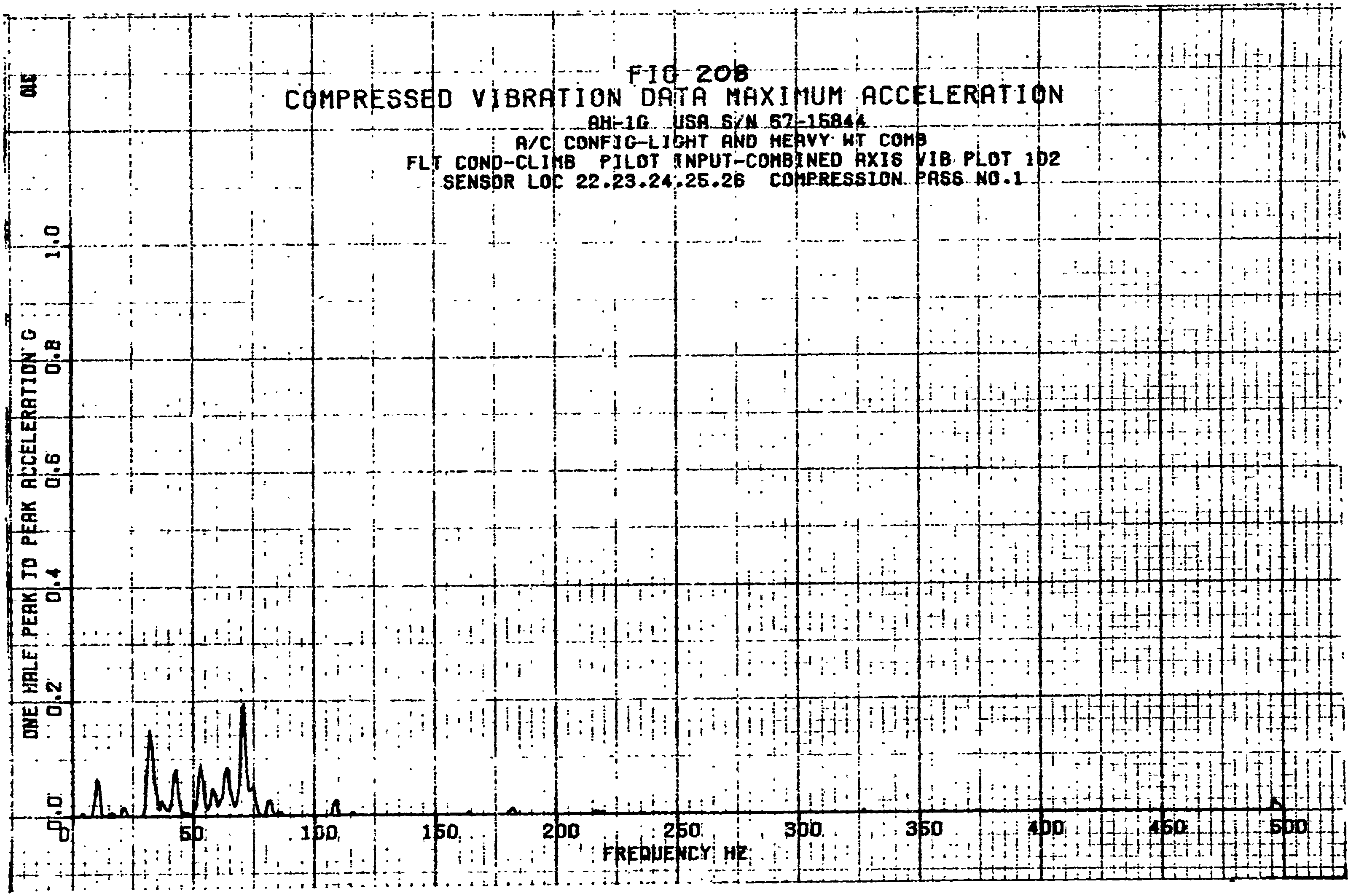


FIG 208
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-CLIMB PILOT INPUT-COMBINED AXIS VIB PLOT 102
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

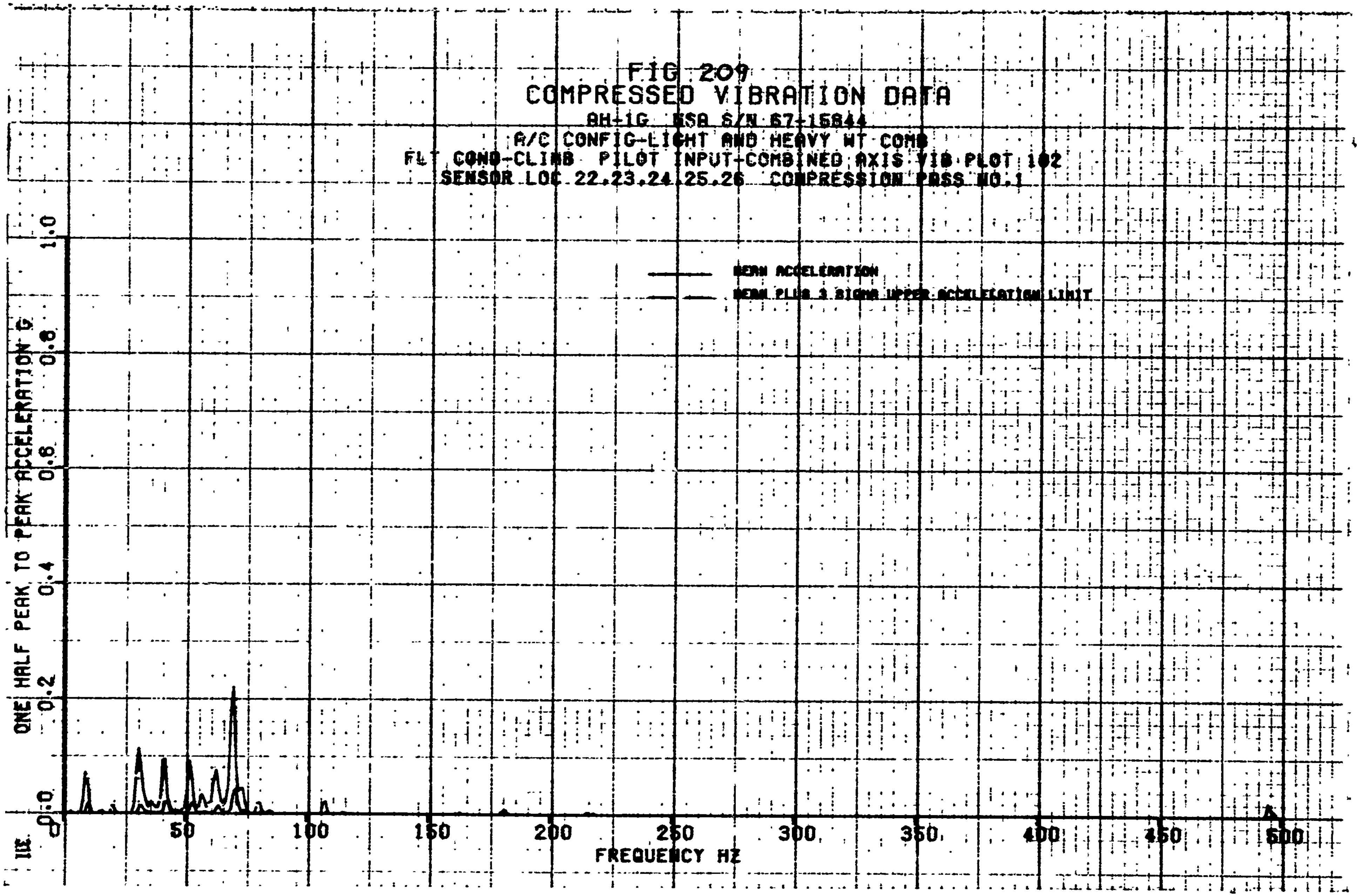


FIG 209
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-CLIMB PILOT INPUT-COMBINED AXIS VIB PLOT 102
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

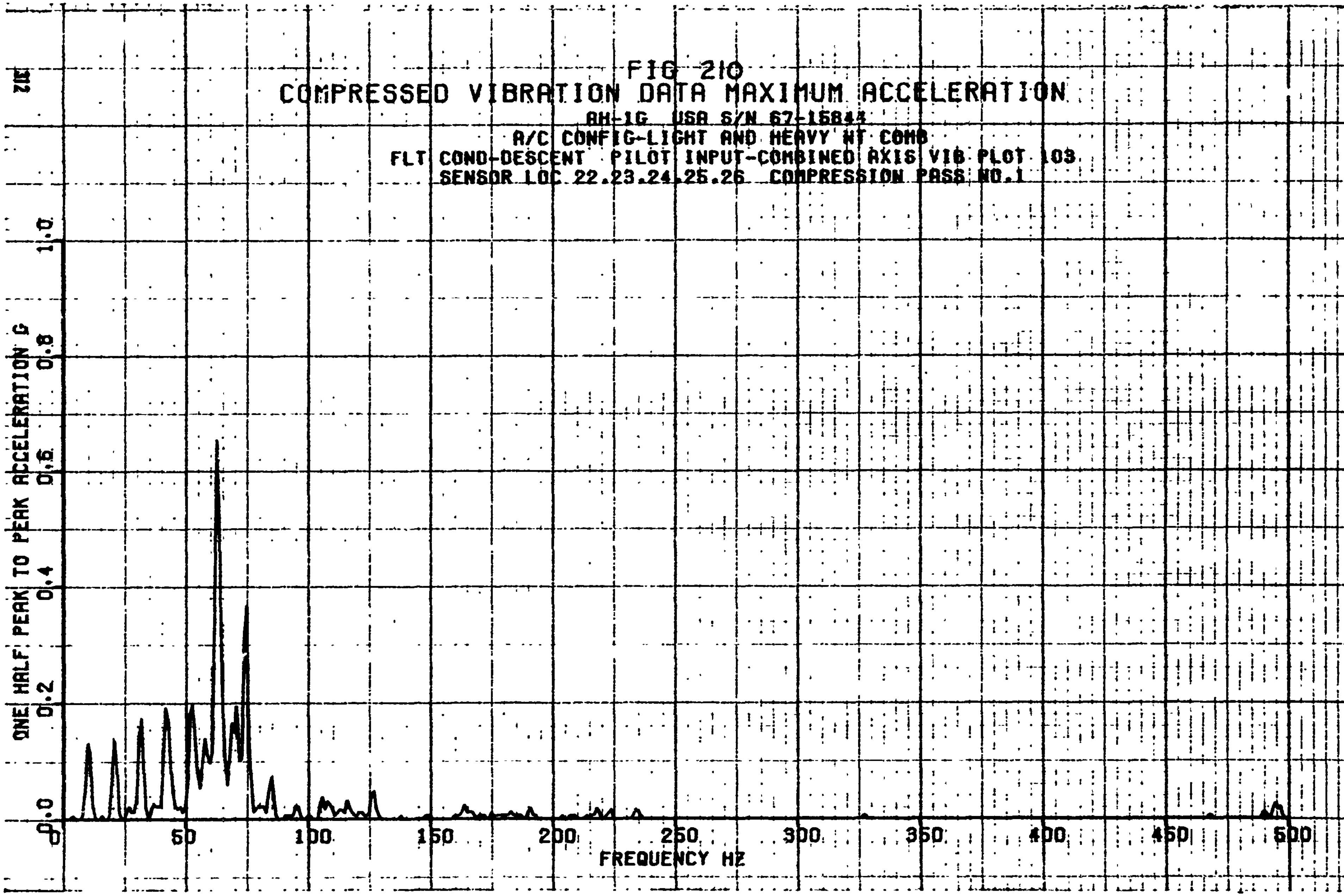


FIG 210
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-DESCENT PILOT INPUT-COMBINED AXIS VIB PLOT 103
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1

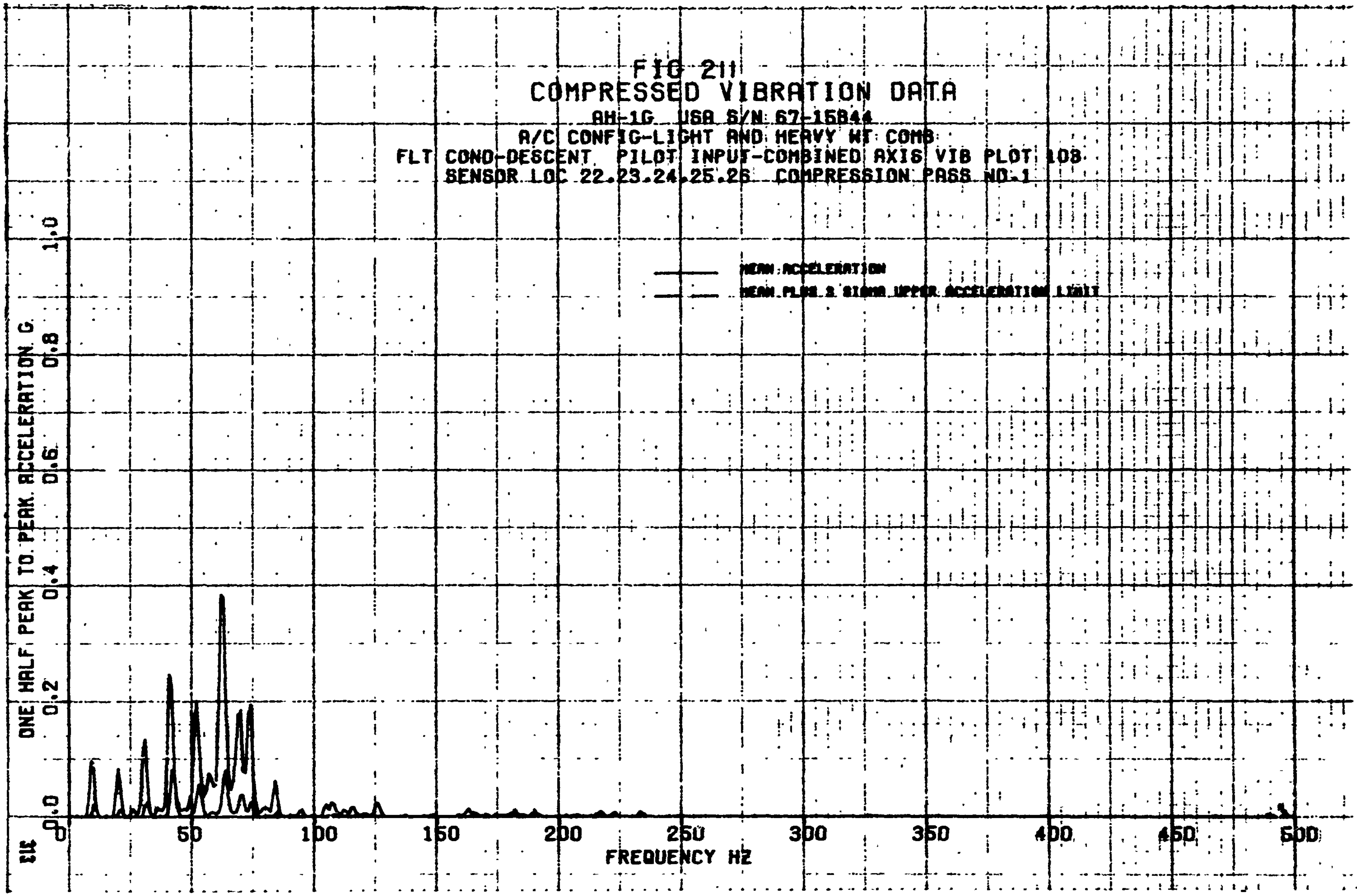
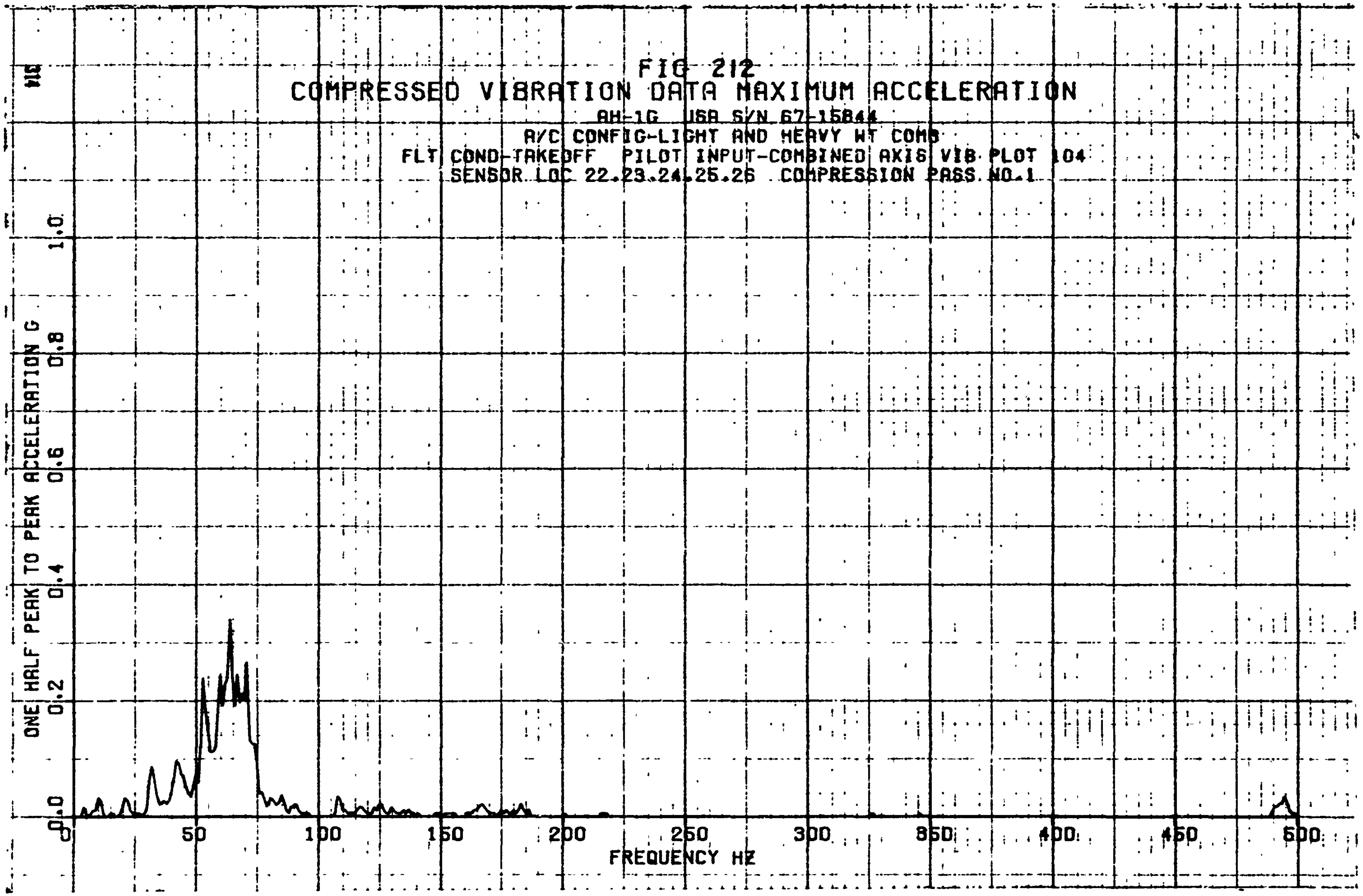


FIG 211
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-DESCENT PILOT INPUT-COMBINED AXIS VIB PLOT 108
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO-1
MEAN ACCELERATION
MEAN PLUS 2 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ



314
FIG 212
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TAKEOFF PILOT INPUT-COMBINED AXIS VIB PLOT 104
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

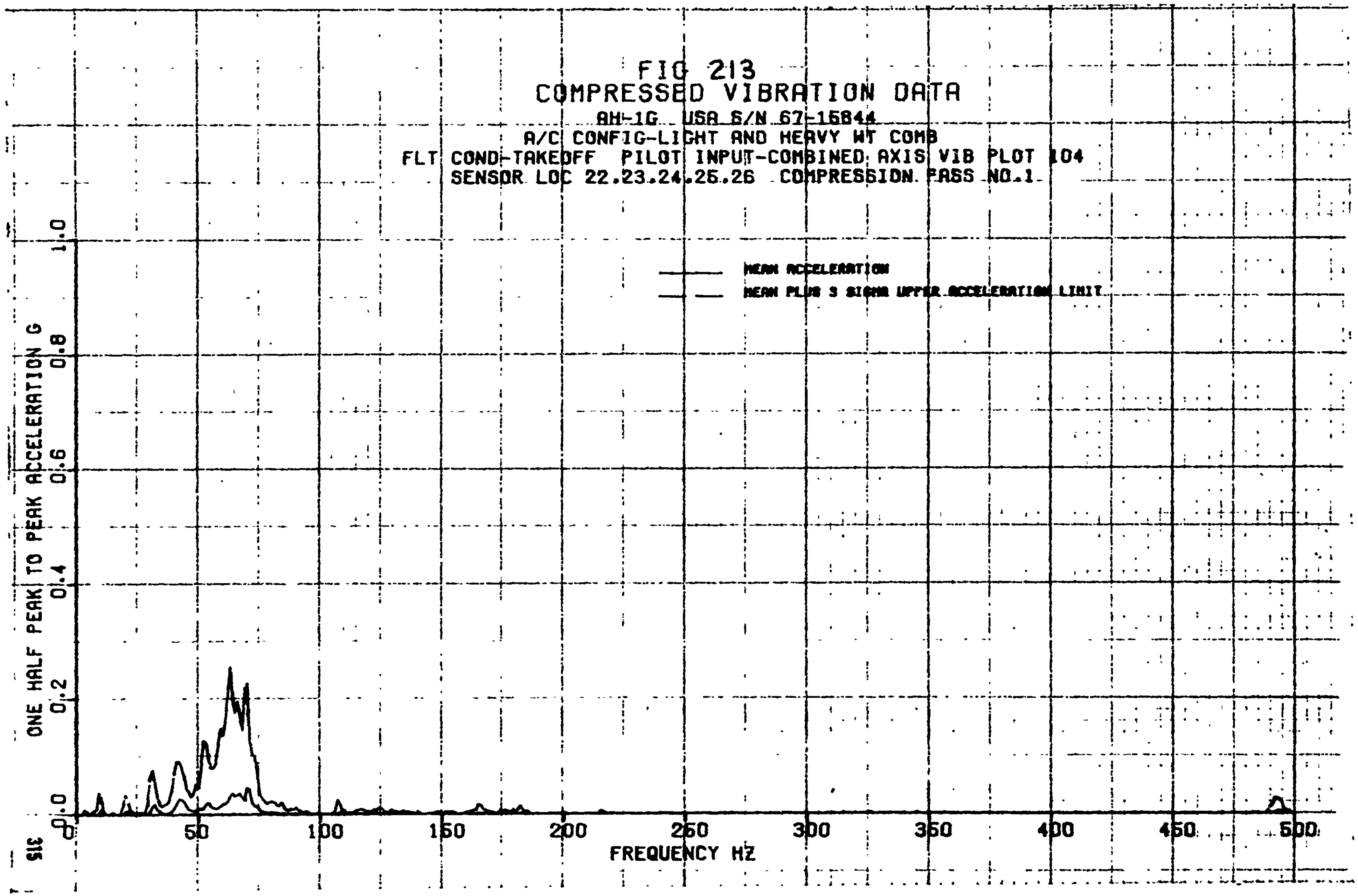


FIG 213
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TAKEOFF PILOT INPUT-COMBINED AXIS VIB PLOT 104
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 214
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LANDING PILOT INPUT-COMBINED AXIS VIB PLOT 105
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1

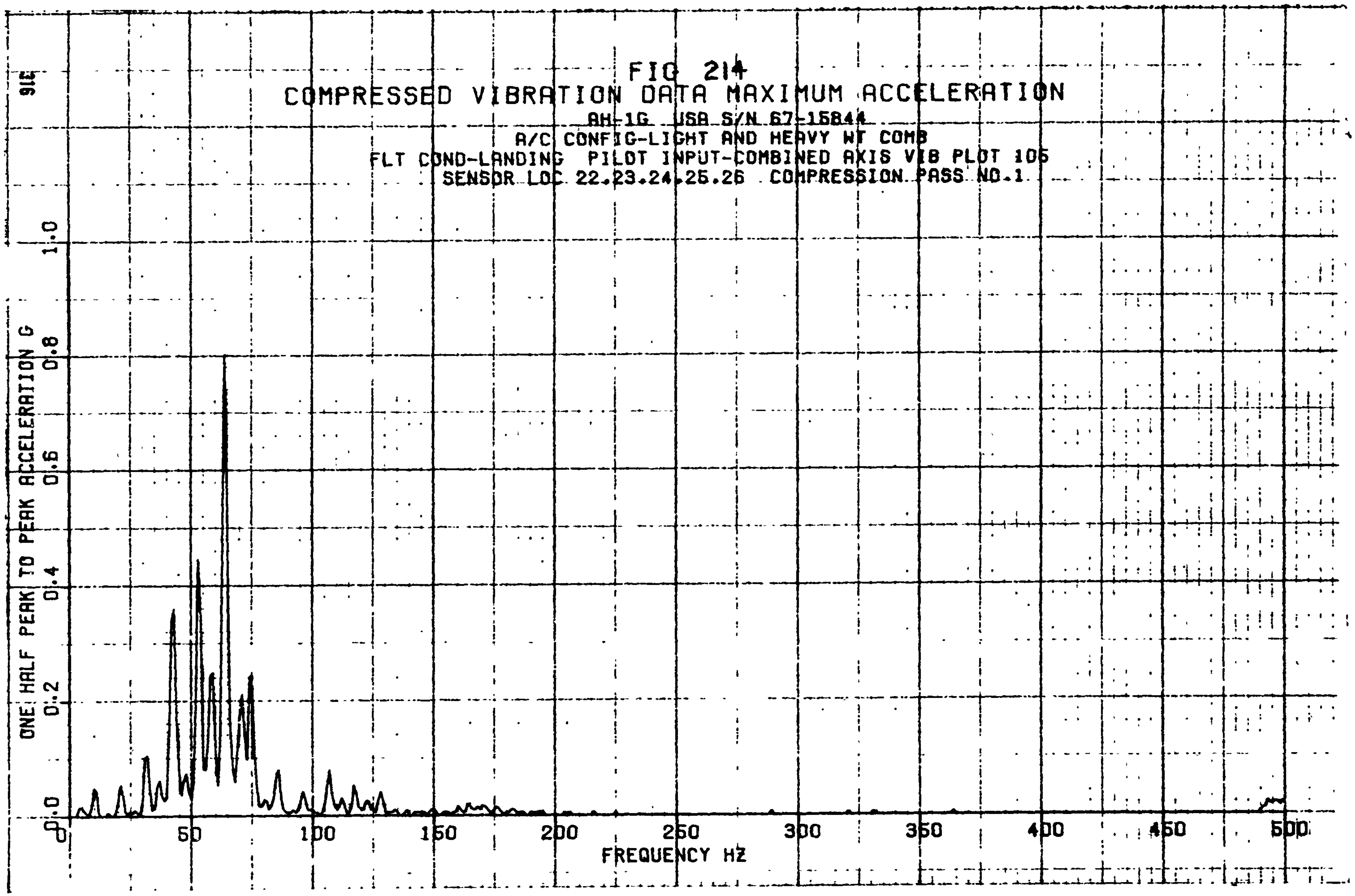


FIG 215
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LANDING PILOT INPUT-COMBINED AXIS VIB PLOT 106
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1

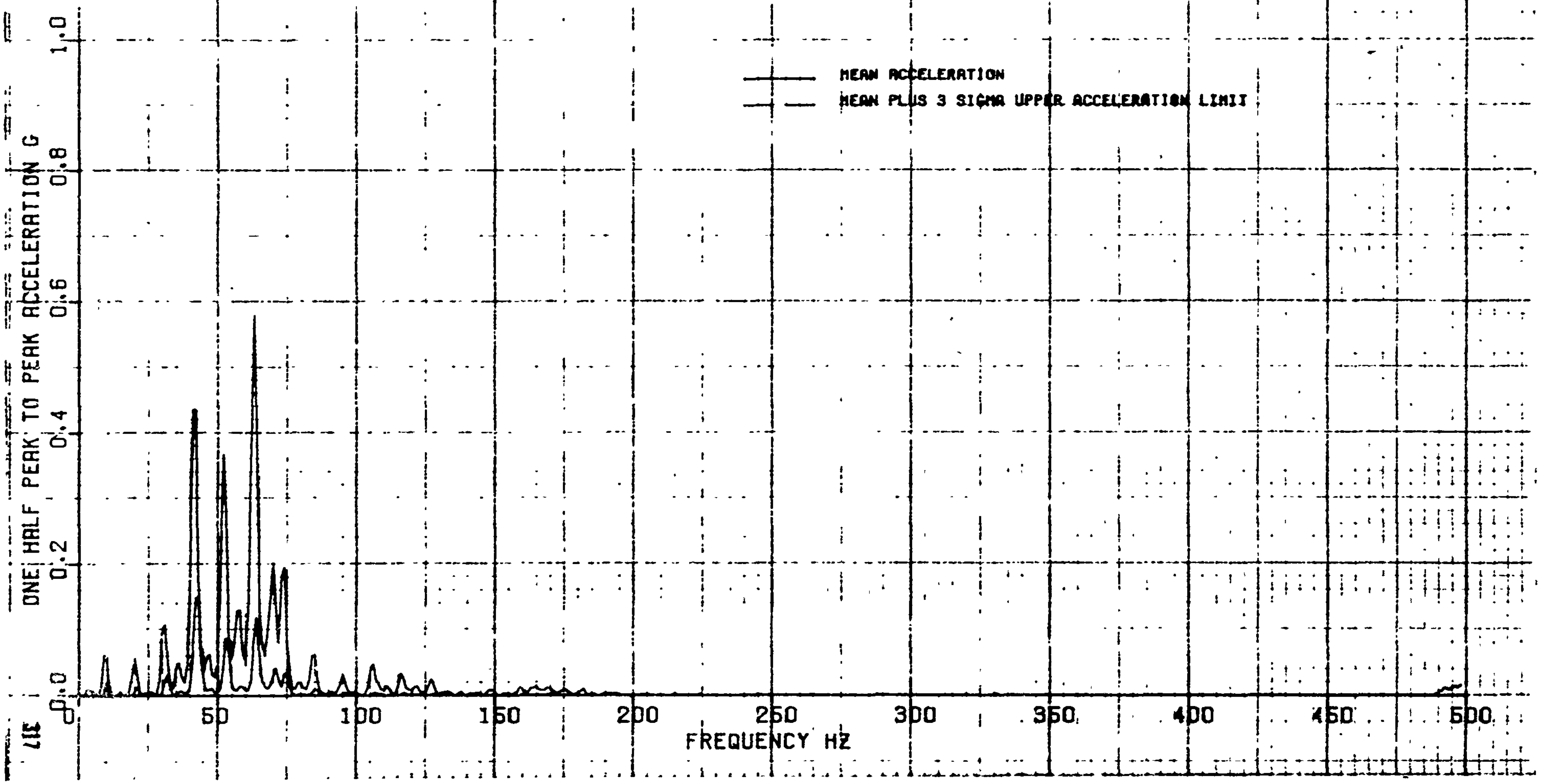
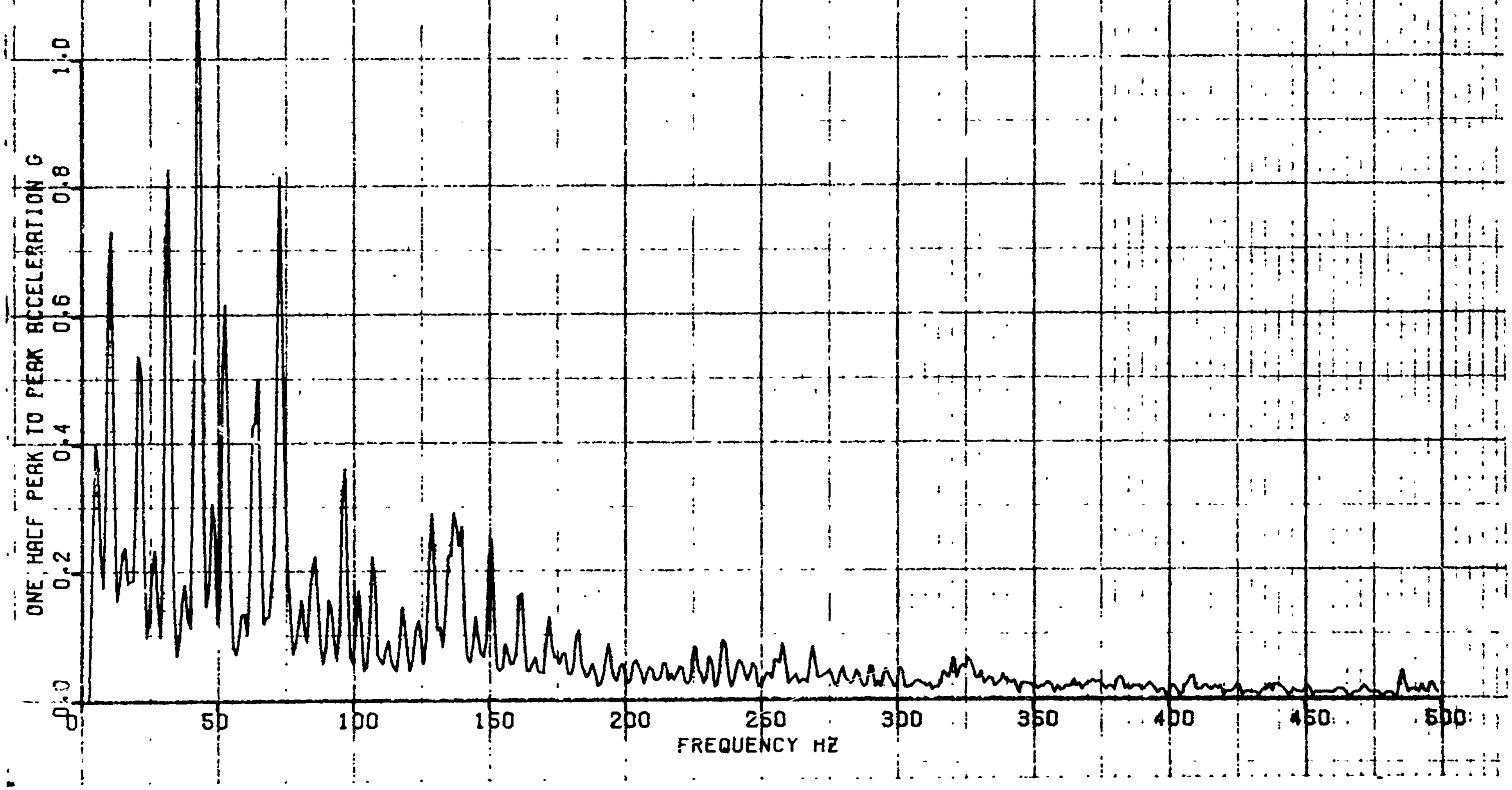


FIG 216

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-MANEUVERING PILOT INPUT-COMBINED AXIS VIB PLOT 106
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1



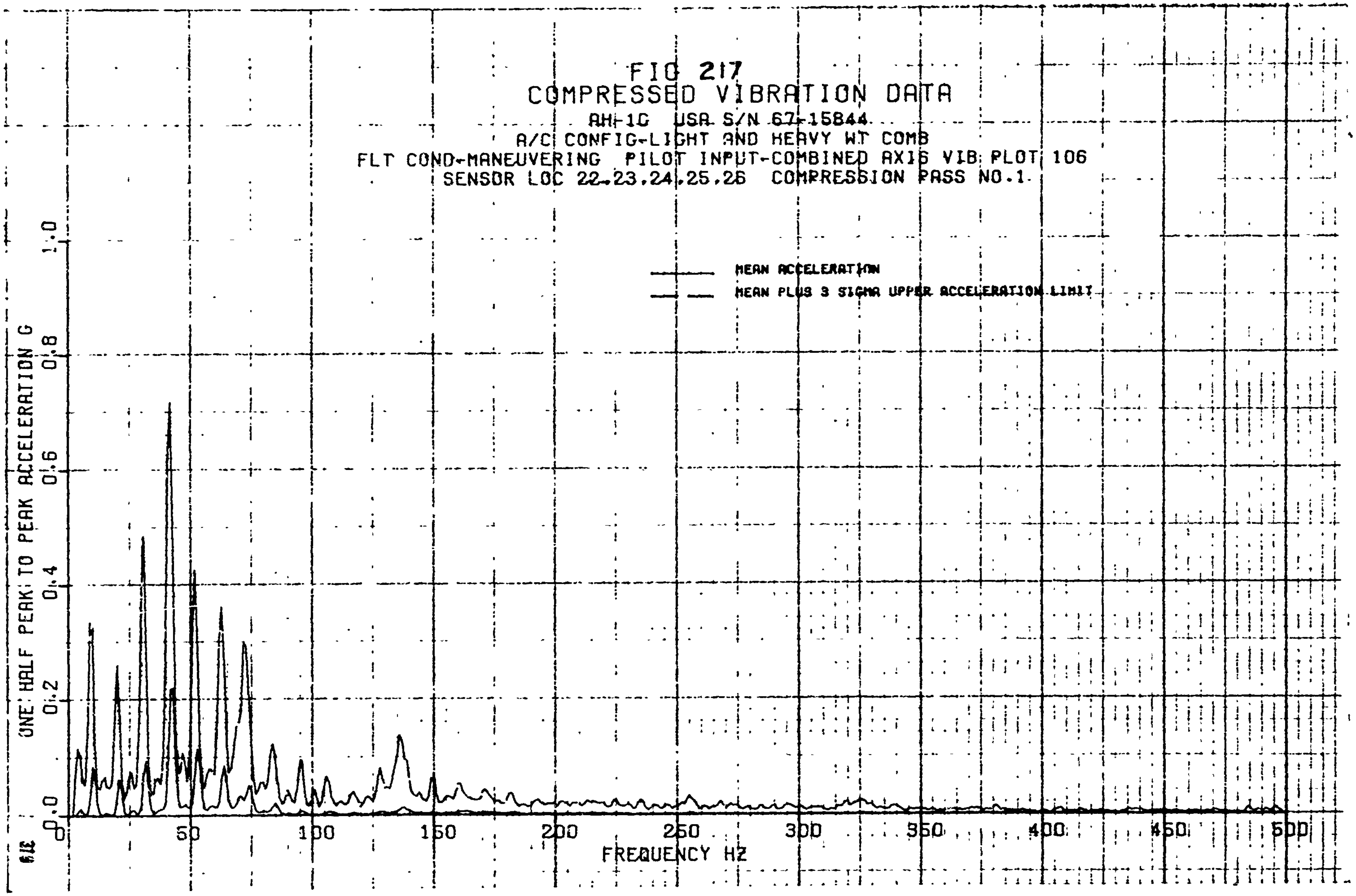


FIG 217
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-MANEUVERING PILOT INPUT-COMBINED AXIS VIB PLOT 106
SENSOR LOC 22,23,24,25,26 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 218
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
GND TEST COND-GND/FLT IDLE PILOT INPUT-COMBINED AXIS VIB PLOT 107
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1

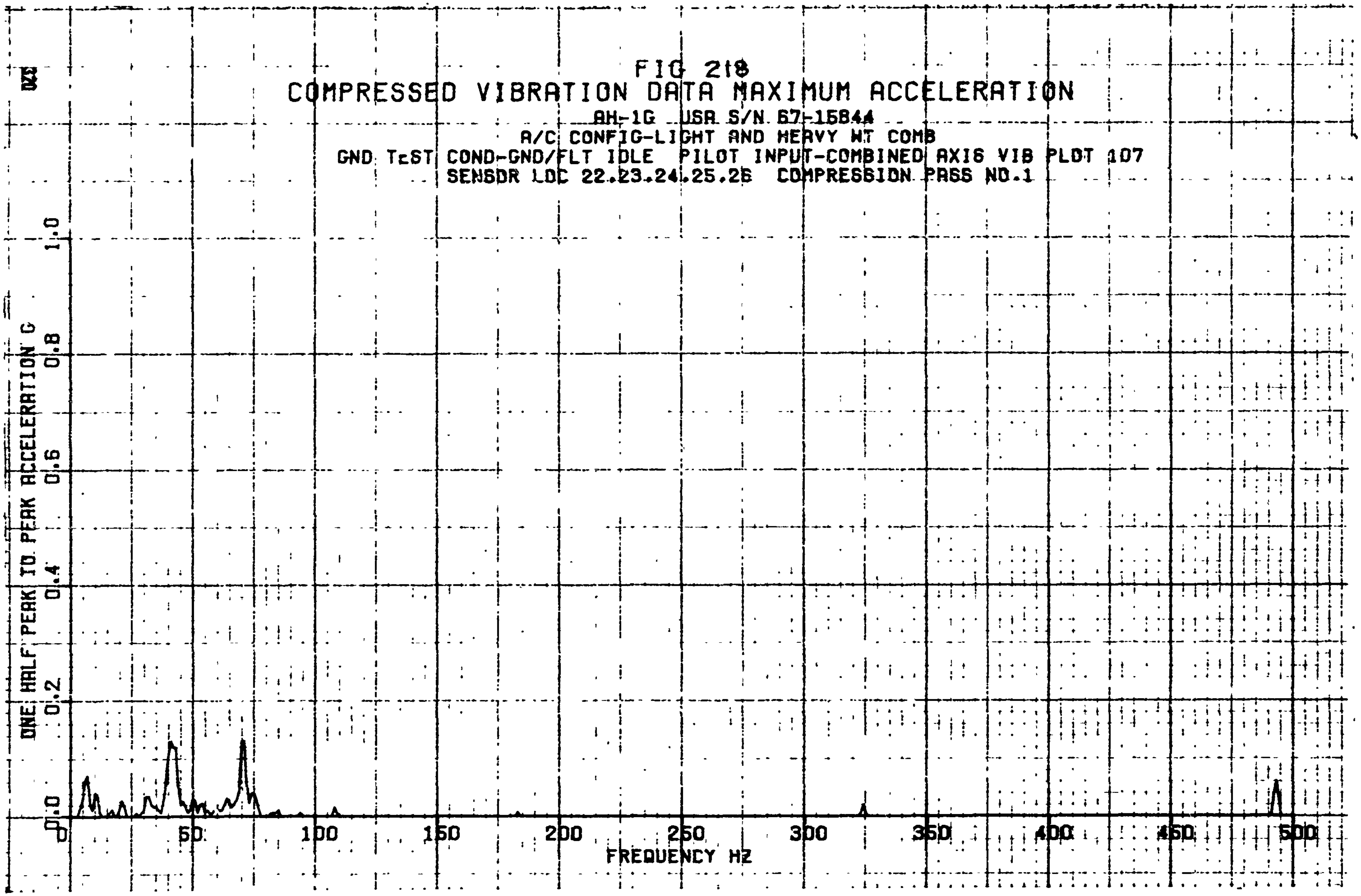


FIG 219
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
GND TEST COND-GND/FLT IDLE PILOT INPUT-COMBINED AXIS VIB PLOT 107
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1

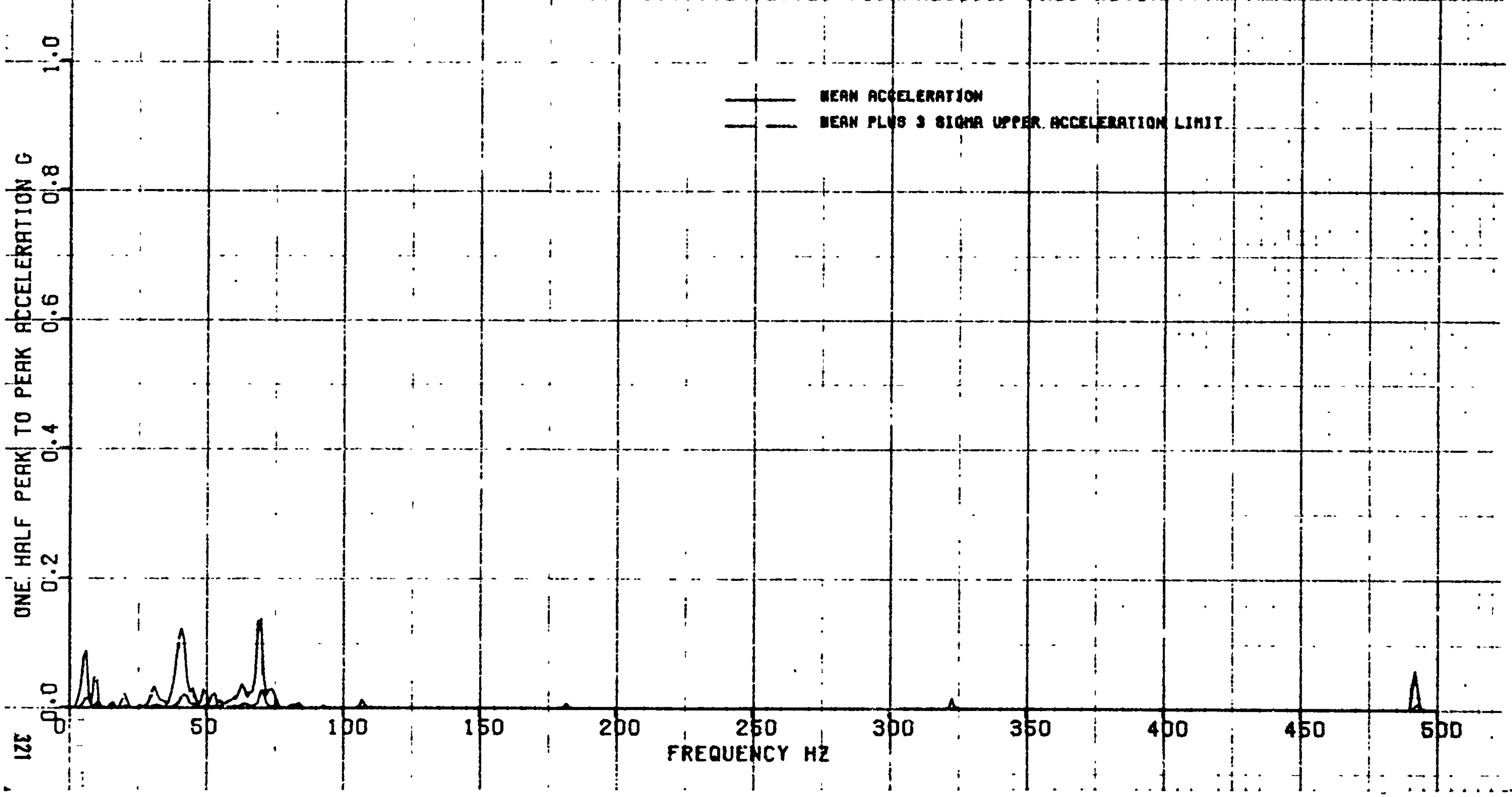


FIG 220

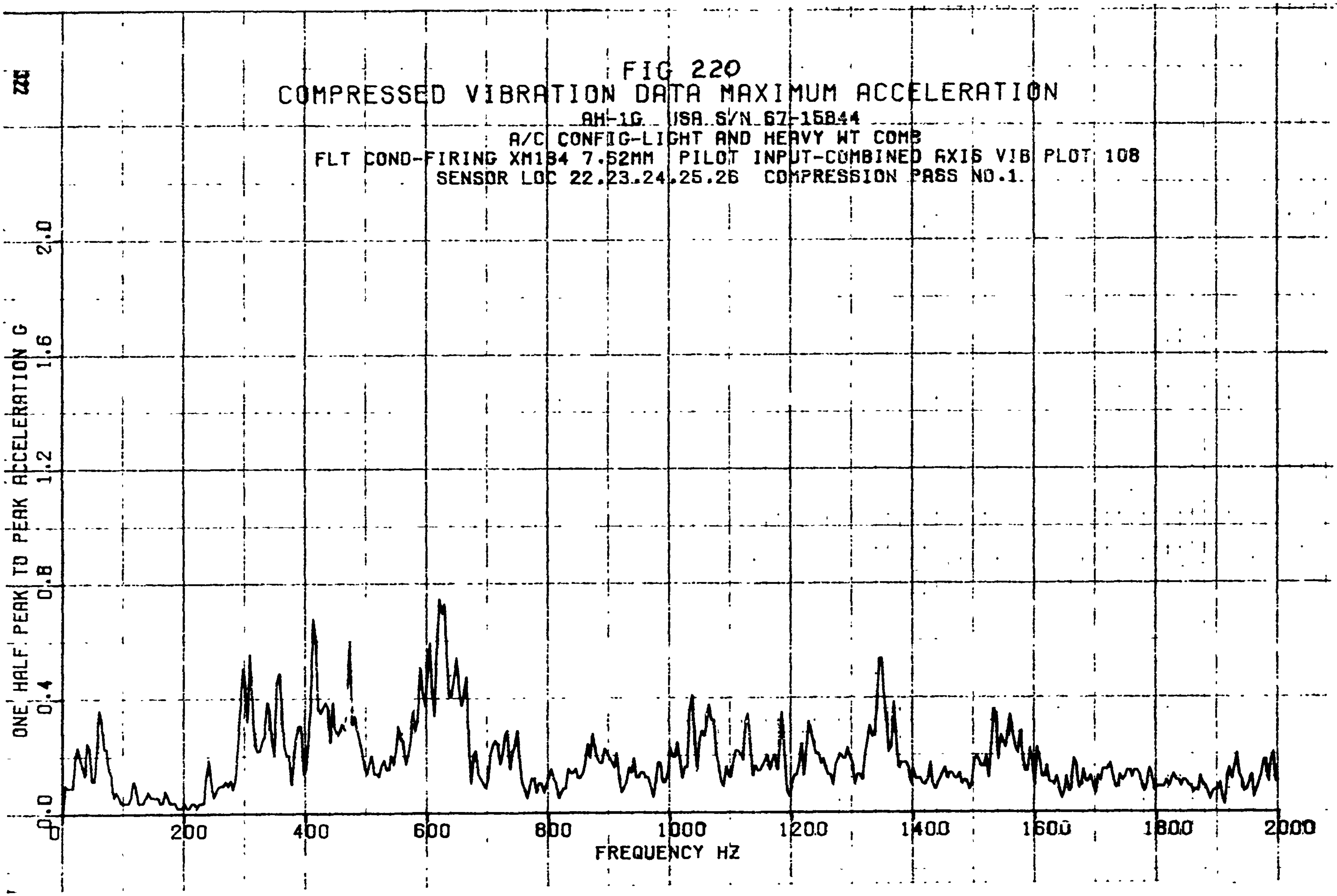
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-FIRING XM134 7.62MM PILOT INPUT-COMBINED AXIS VIB PLOT 108

SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1



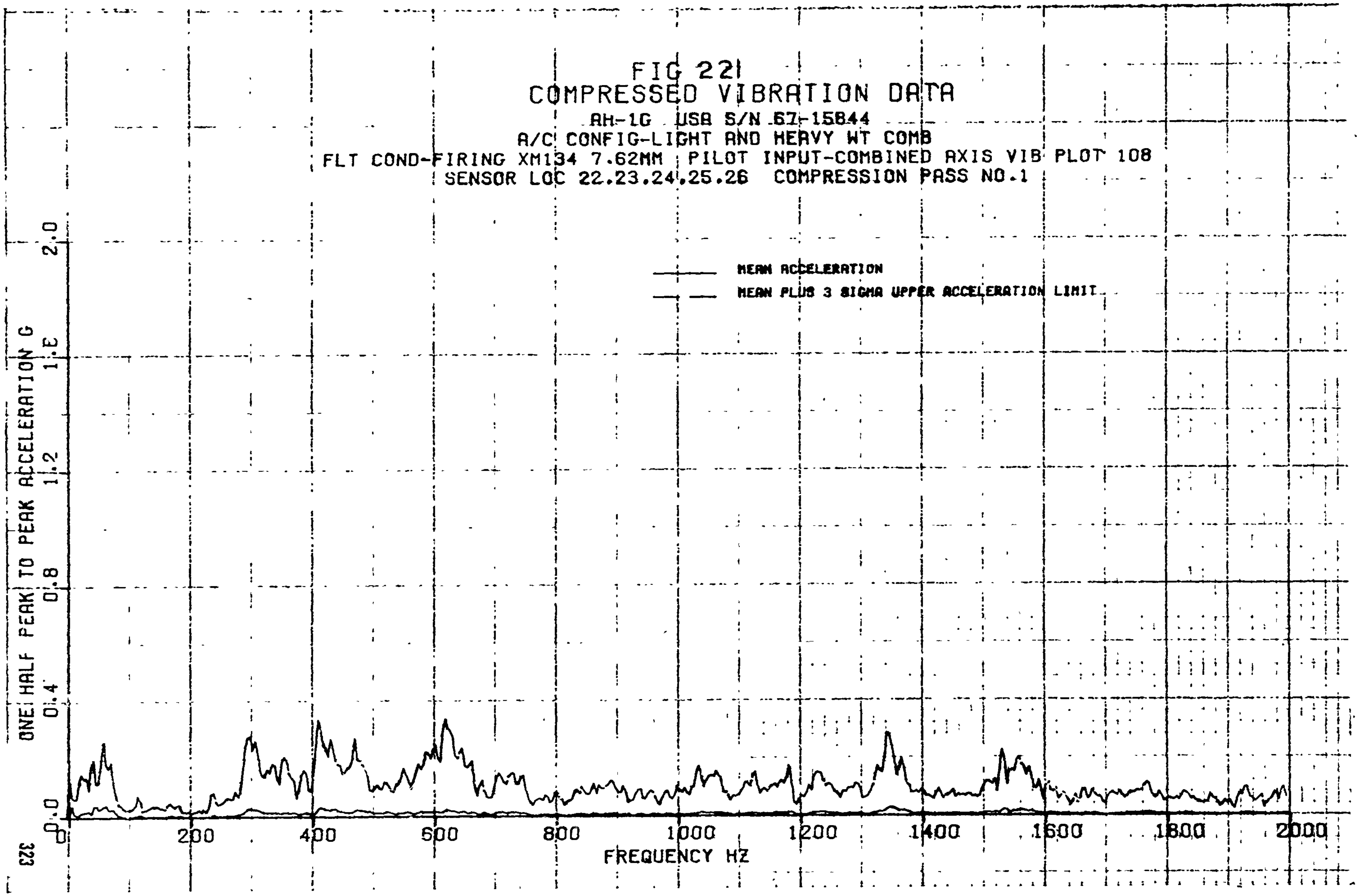


FIG 221
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM134 7.62MM PILOT INPUT-COMBINED AXIS VIB PLOT 108
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.E
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 222

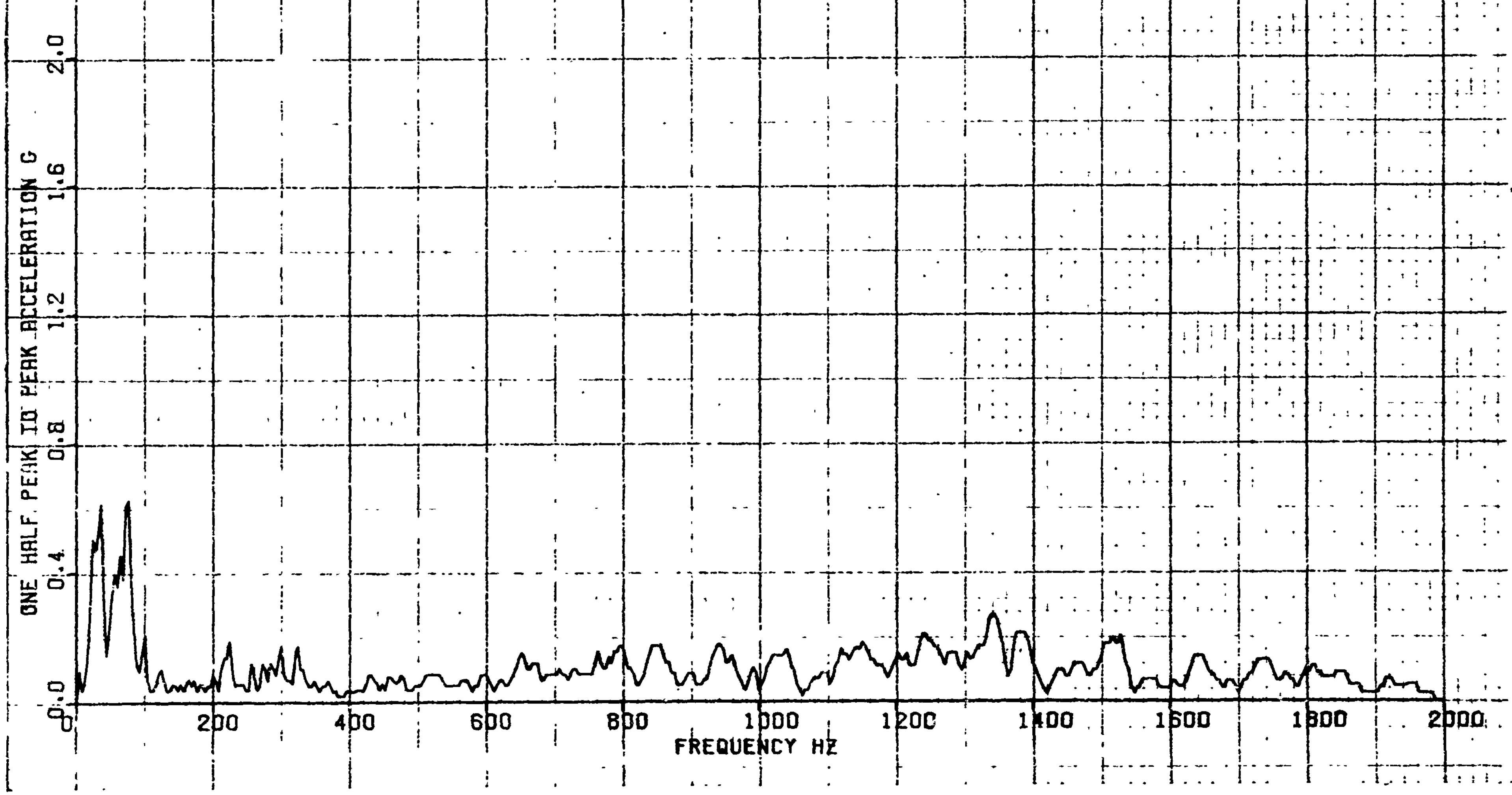
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-FIRING XM129 40MM GRENADE PILOT INPUT-COMBINED AXIS VIB PLOT 109

SENSOR LOC 22,23,24,25,26 COMPRESSION PASS NO.1



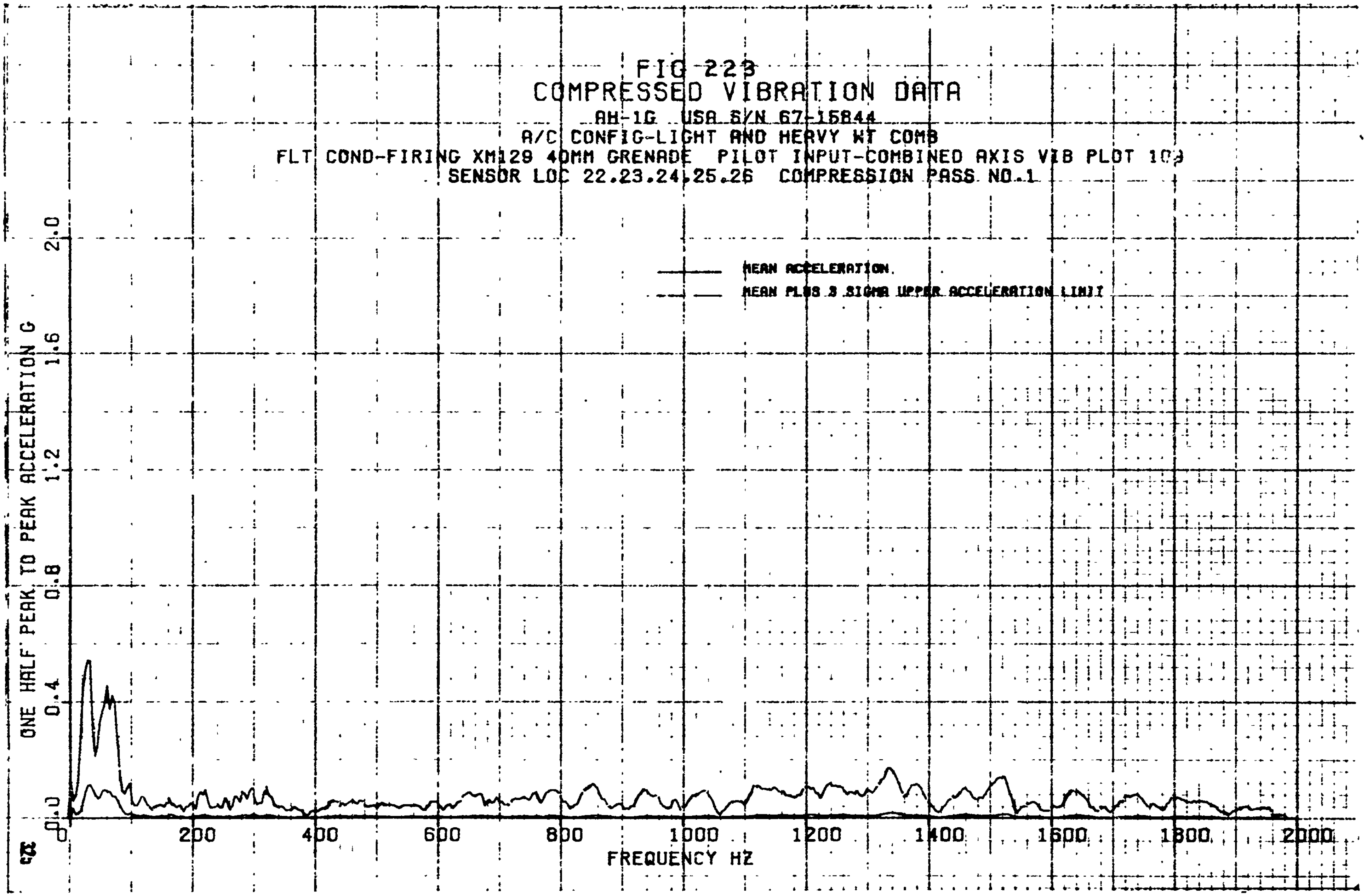


FIG 223
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM129 40MM GRENADE PILOT INPUT-COMBINED AXIS VIB PLOT 109
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 224

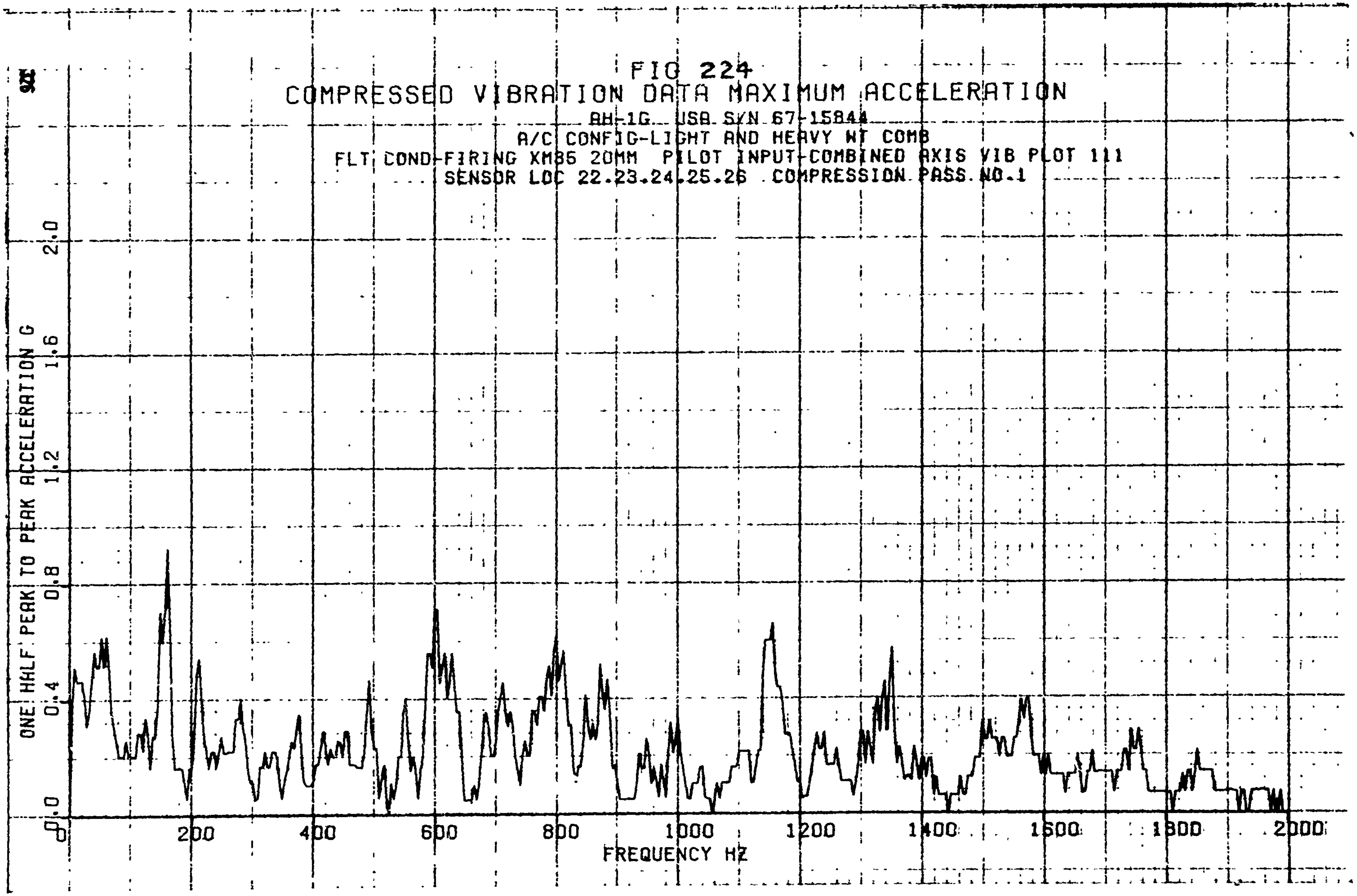
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-FIRING XM35 20MM PILOT INPUT-COMBINED AXIS VIB PLOT 111

SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1



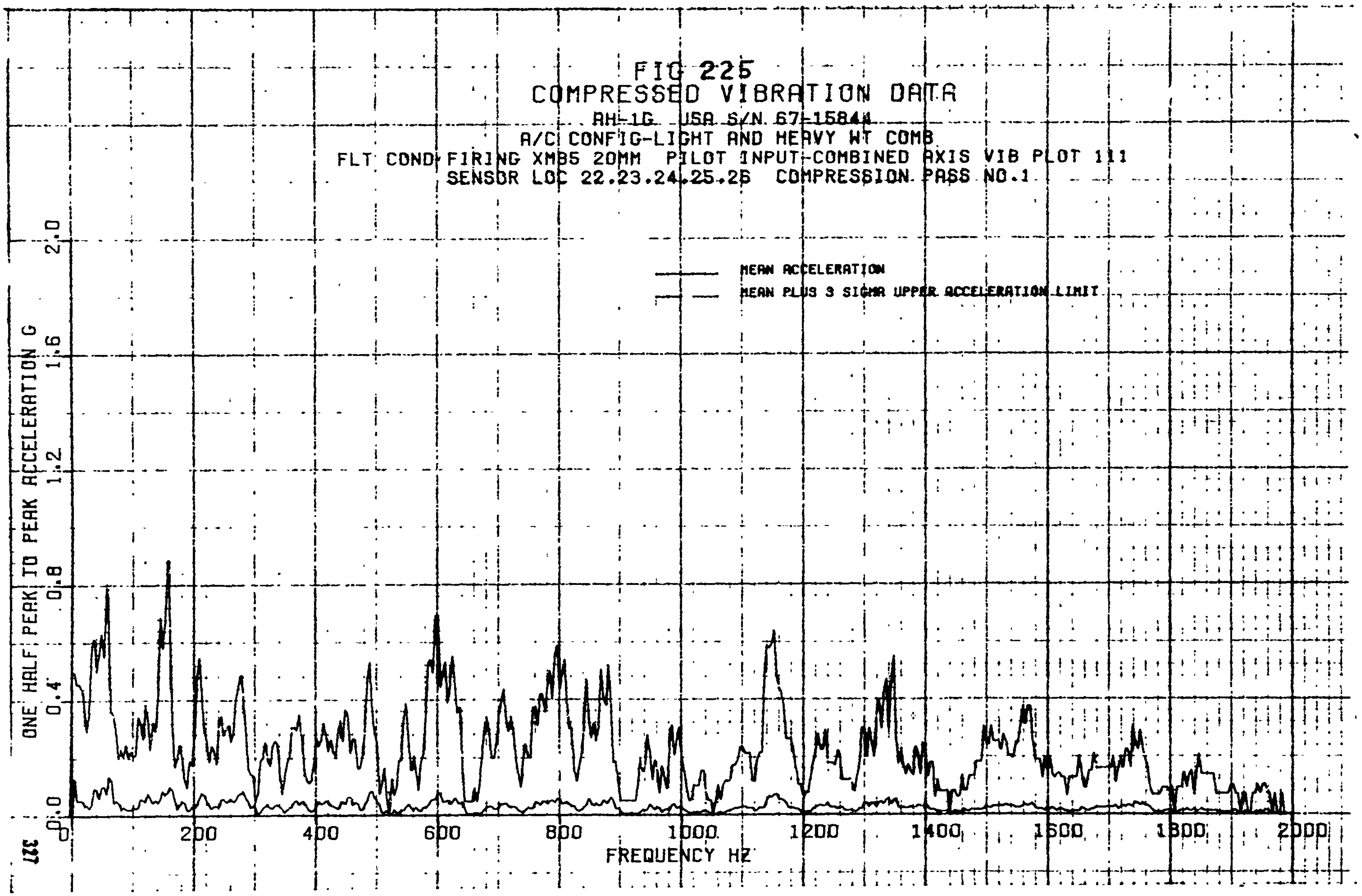


FIG 225
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM35 20MM PILOT INPUT-COMBINED AXIS VIB PLOT 111
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

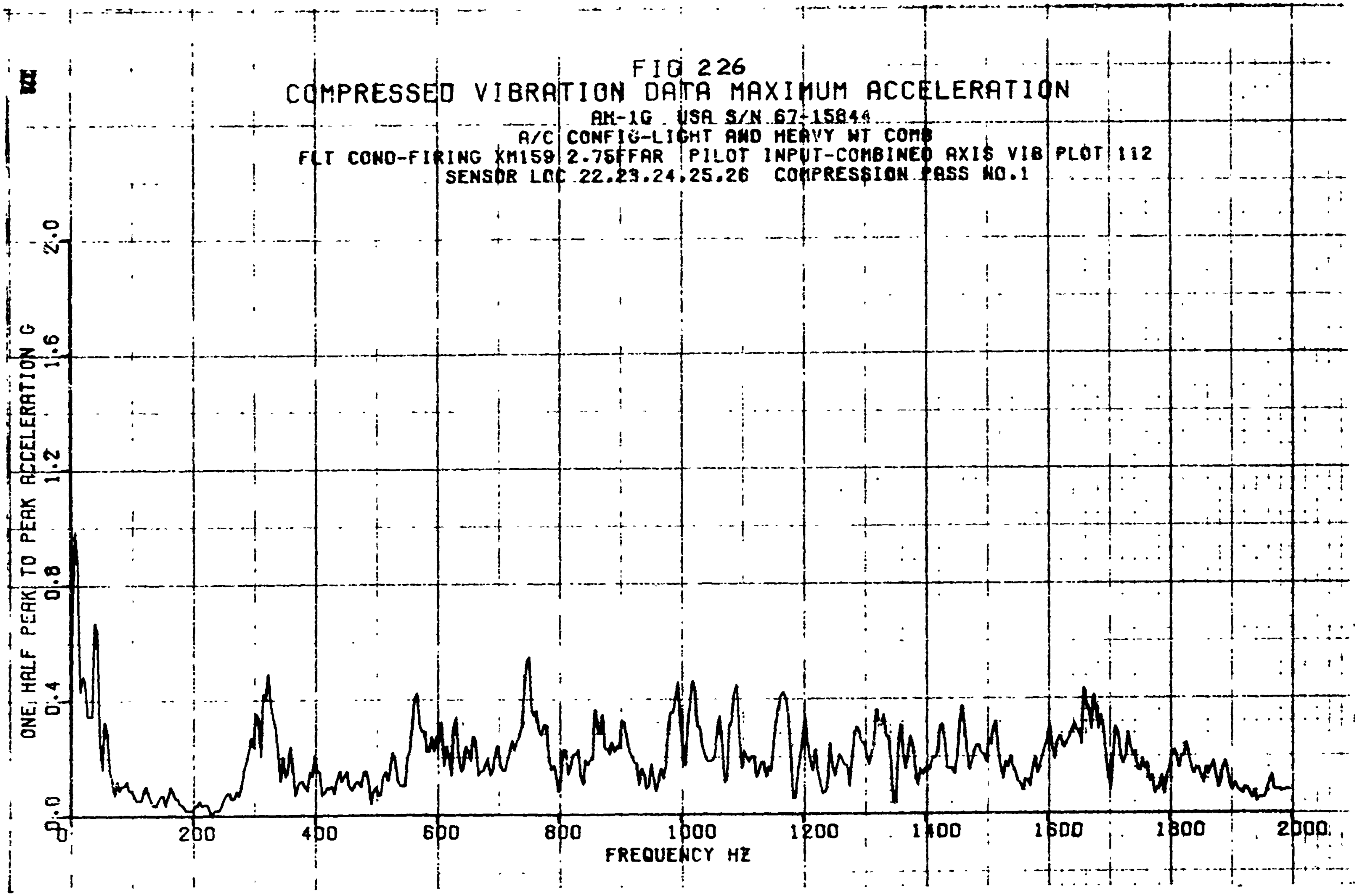
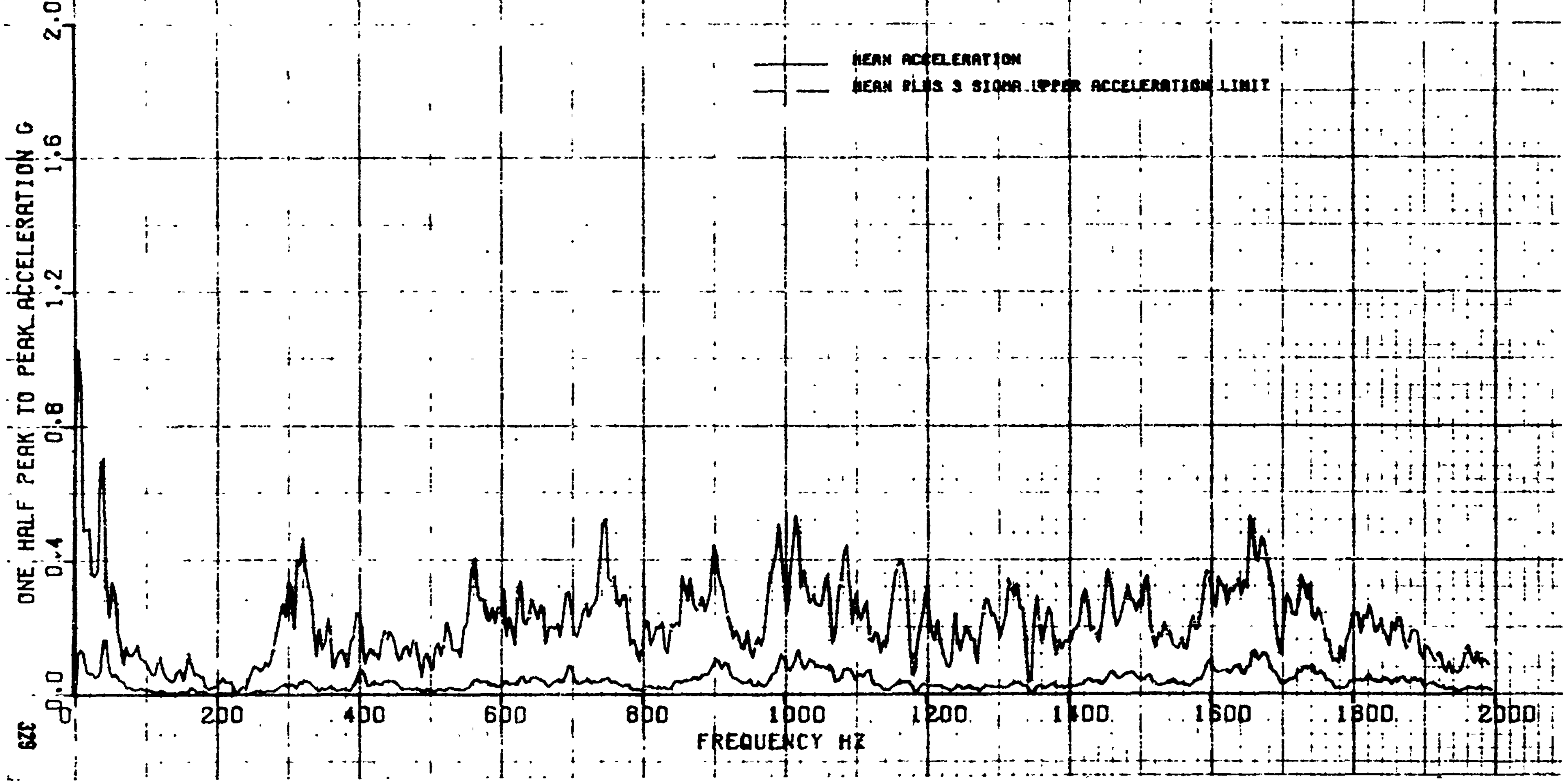


FIG 226
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM159 2.75FFAR PILOT INPUT-COMBINED AXIS VIB PLOT 112
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 227

COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM159 2.75FFAR PILOT INPUT-COMBINED AXIS VIB PLOT 112
SENSOR LOC 22.23.24.25.26 COMPRESSION PASS NO.1



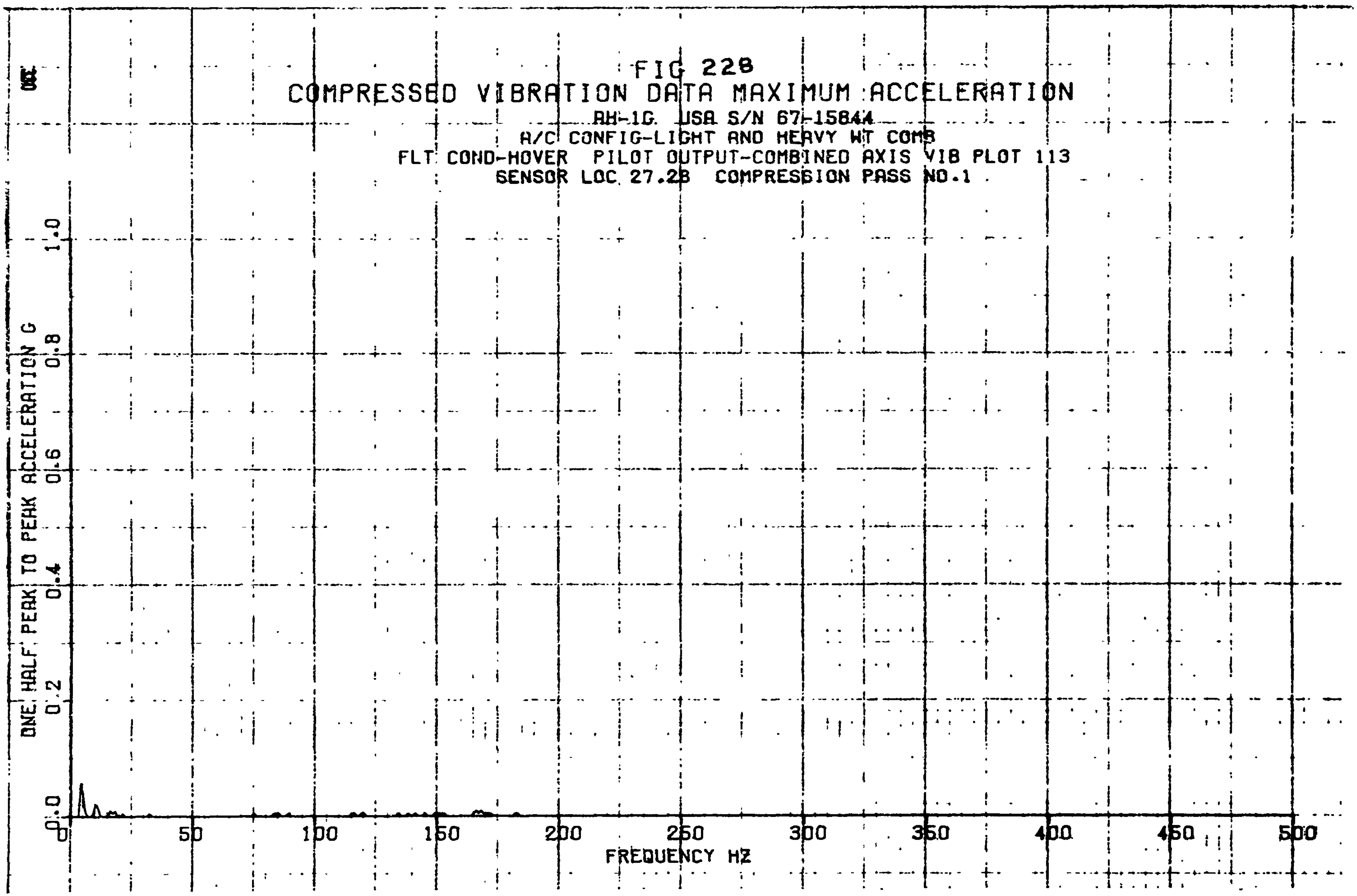


FIG 228
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-HOVER PILOT OUTPUT-COMBINED AXIS VIB PLOT 113
SENSOR LOC 27.2B COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

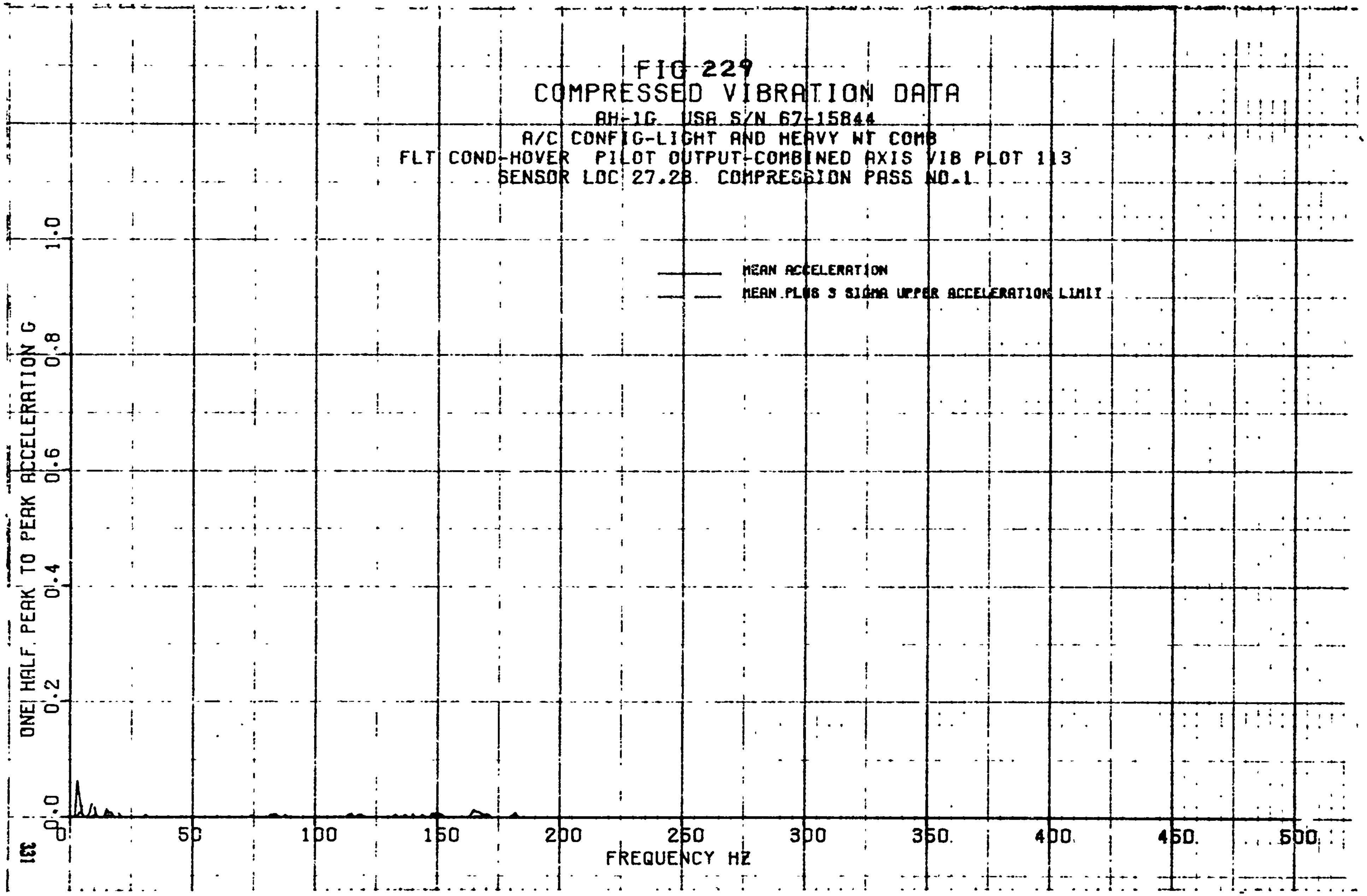


FIG 229
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-HOVER PILOT OUTPUT-COMBINED AXIS VIB PLOT 113
SENSOR LOC 27.28 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

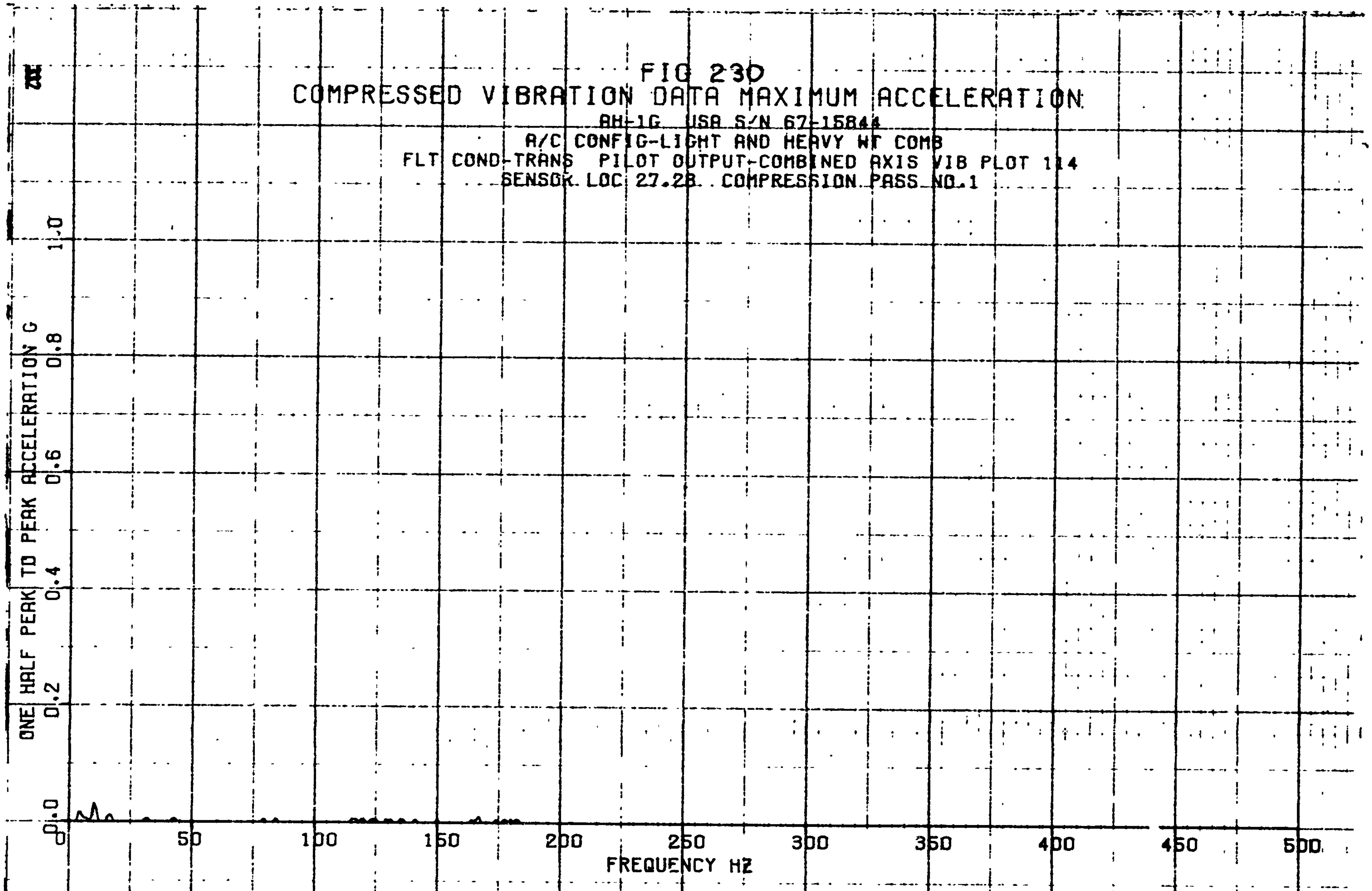


FIG 230
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TRANS PILOT OUTPUT-COMBINED AXIS VIB PLOT 114
SENSOR LOC 27.28 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

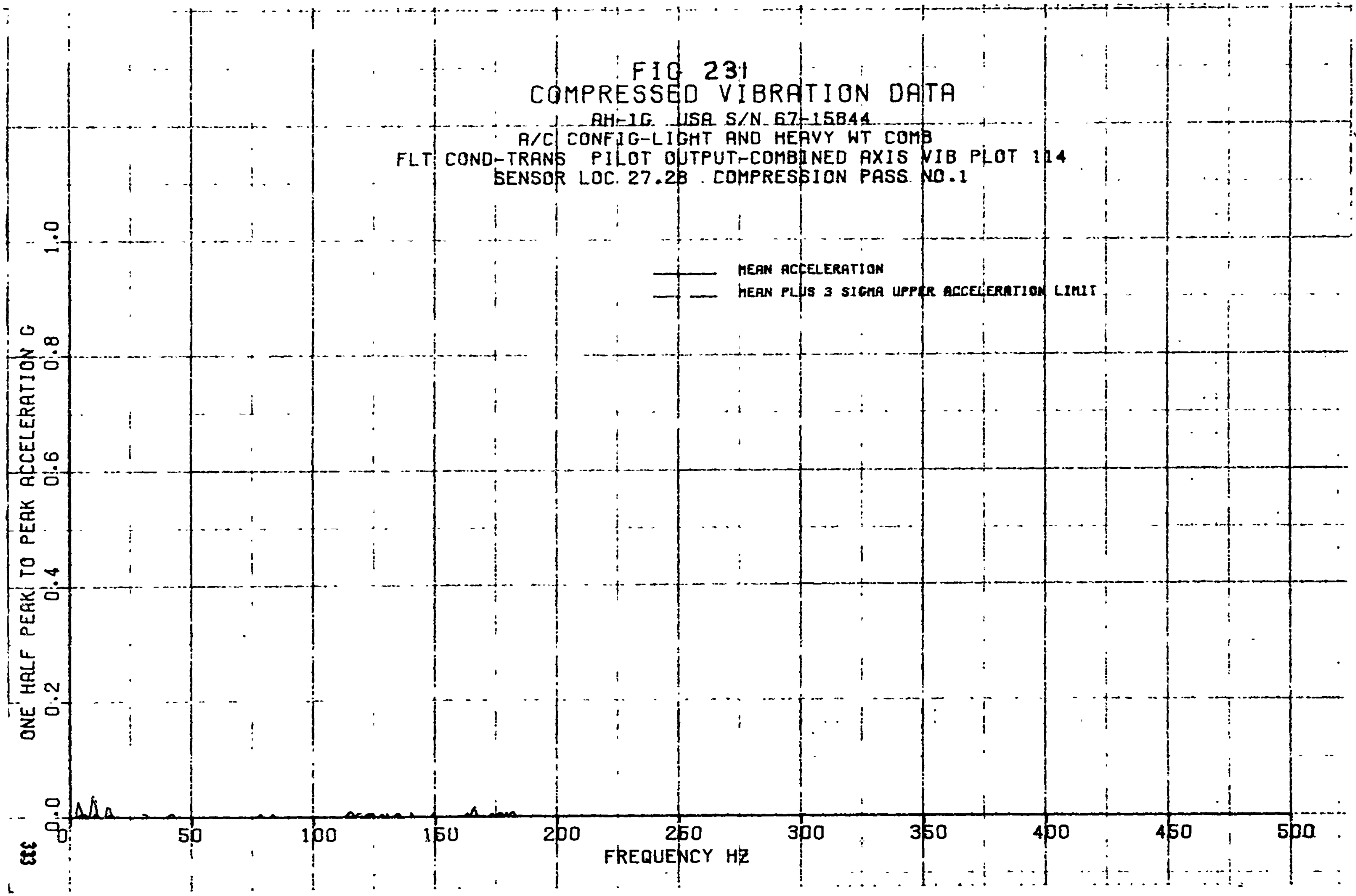
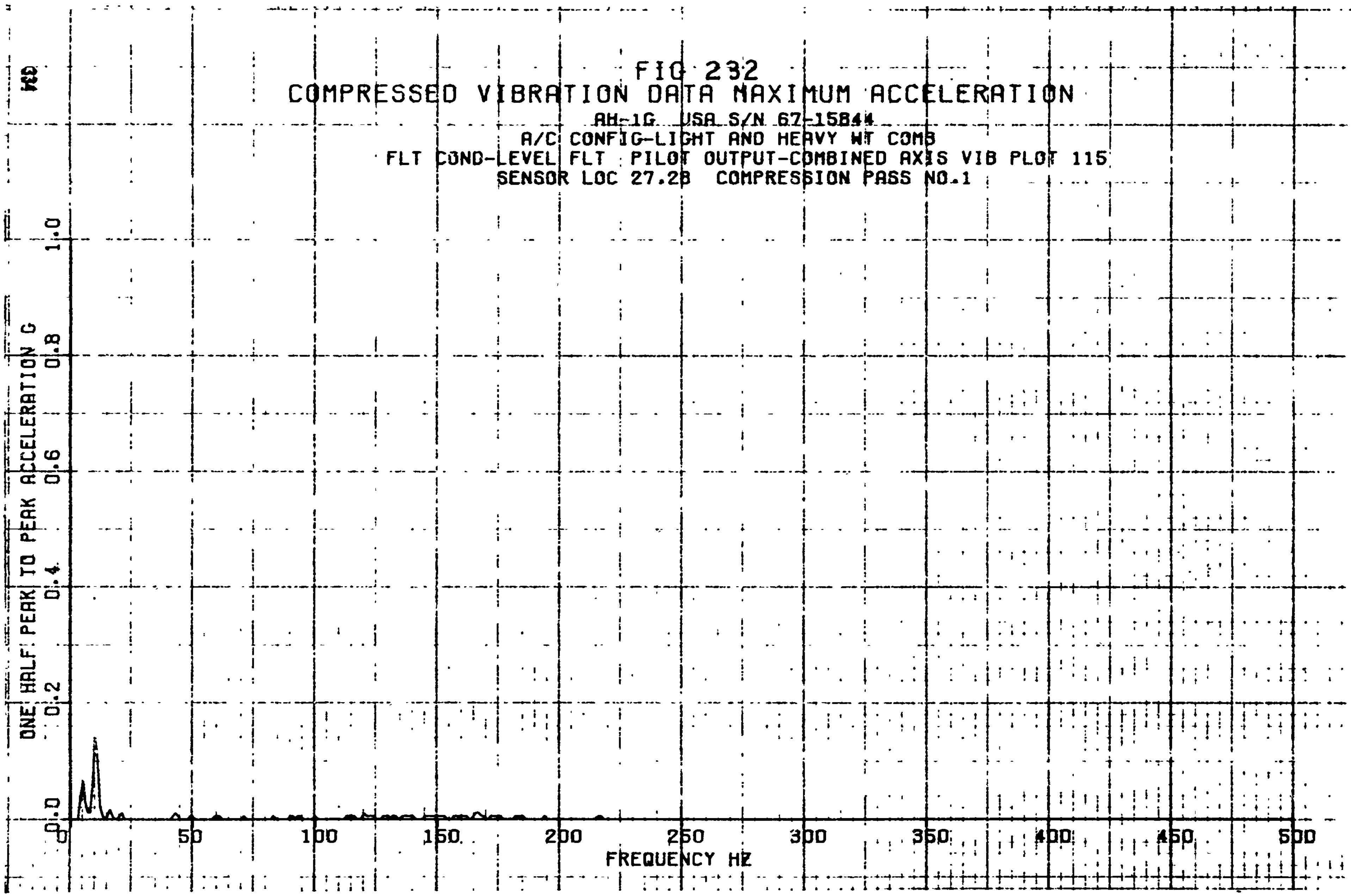


FIG 231
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TRANS PILOT OUTPUT-COMBINED AXIS VIB PLOT 114
SENSOR LOC. 27.28 . COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 232
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LEVEL FLT PILOT OUTPUT-COMBINED AXIS VIB PLOT 115
SENSOR LOC 27.28 COMPRESSION PASS NO.1



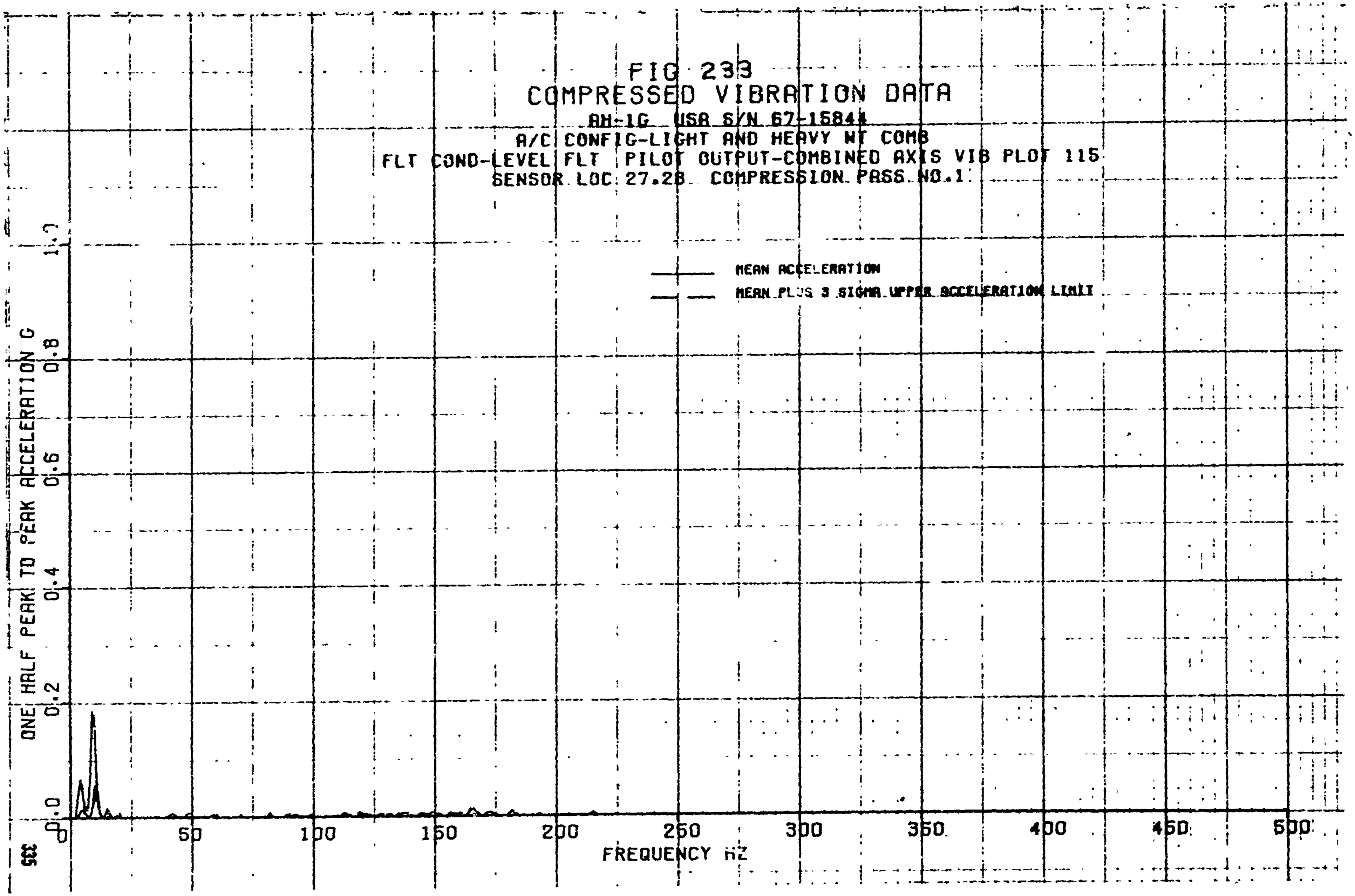


FIG 233
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LEVEL FLT PILOT OUTPUT-COMBINED AXIS VIB PLOT 115
SENSOR LOC 27.28 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 234

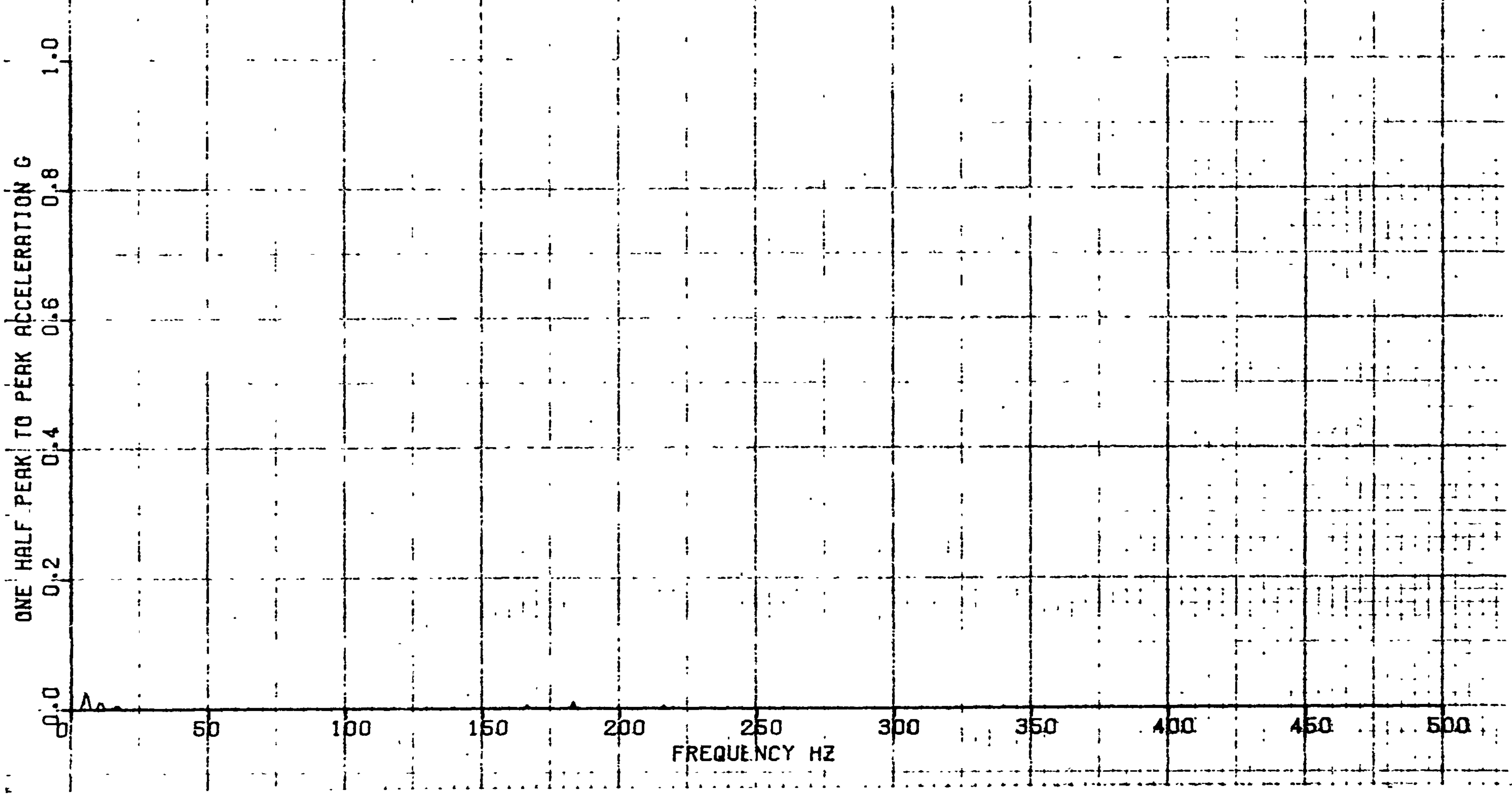
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-CLIMB PILOT OUTPUT-COMBINED AXIS VIB PLOT 116

SENSOR LOC 27.28 COMPRESSION PASS NO.1



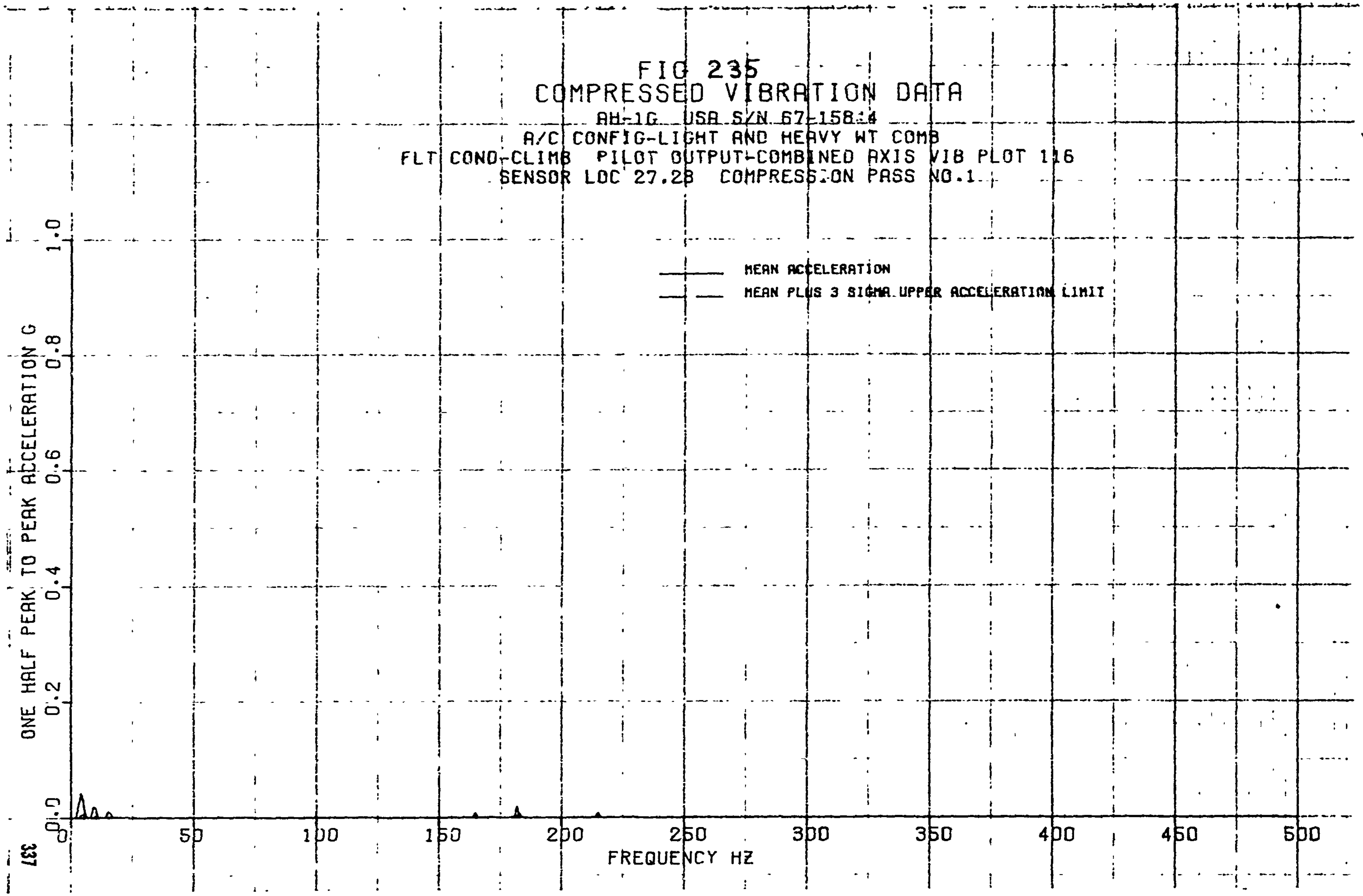


FIG 235
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-158:4
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-CLIMB PILOT OUTPUT-COMBINED AXIS VIB PLOT 116
SENSOR LOC 27.28 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

338

FIG 236

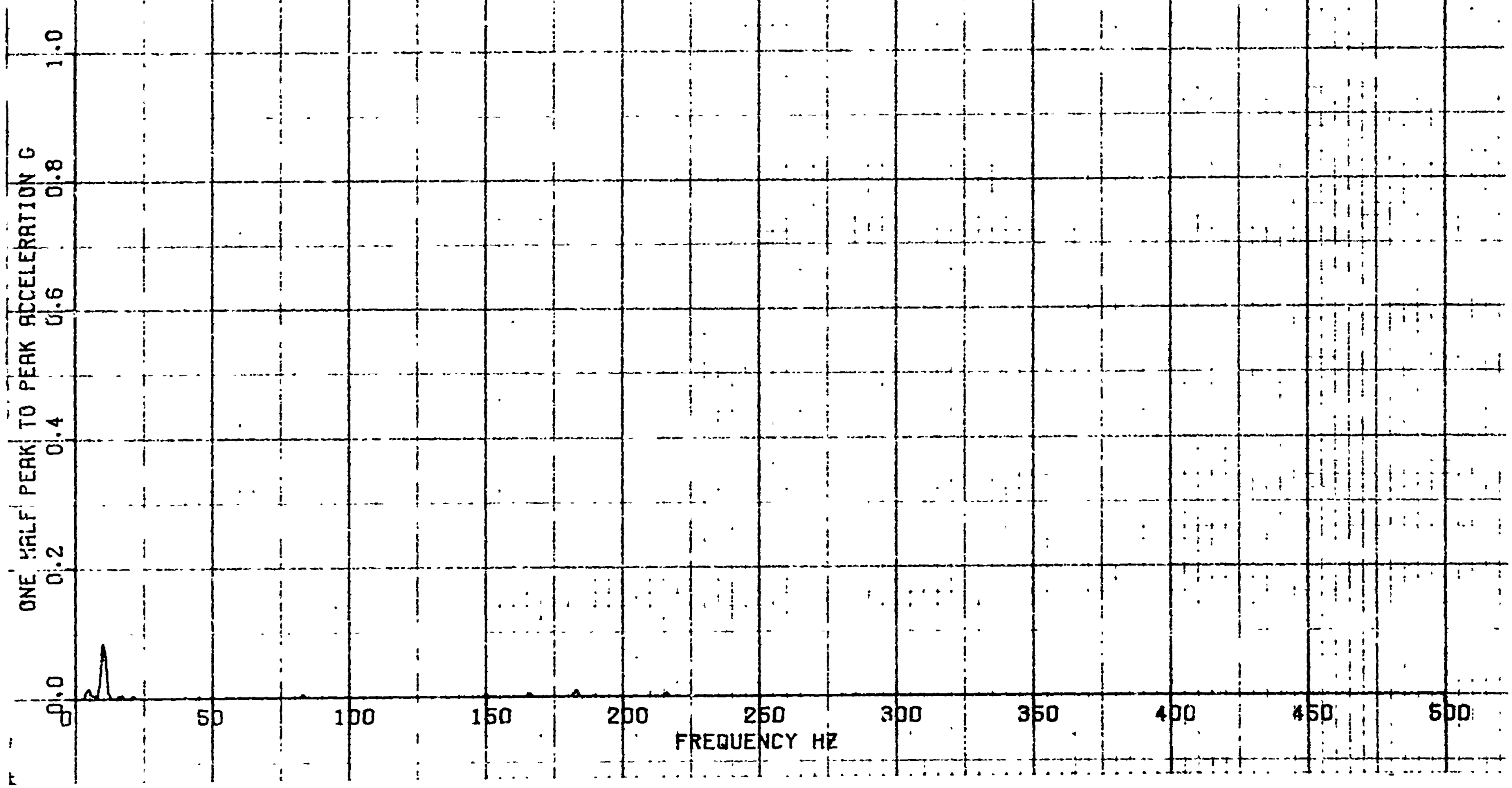
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-DESCENT PILOT OUTPUT-COMBINED AXIS VIB PLOT 117

SENSOR LOC 27.28 COMPRESSION PASS NO.1



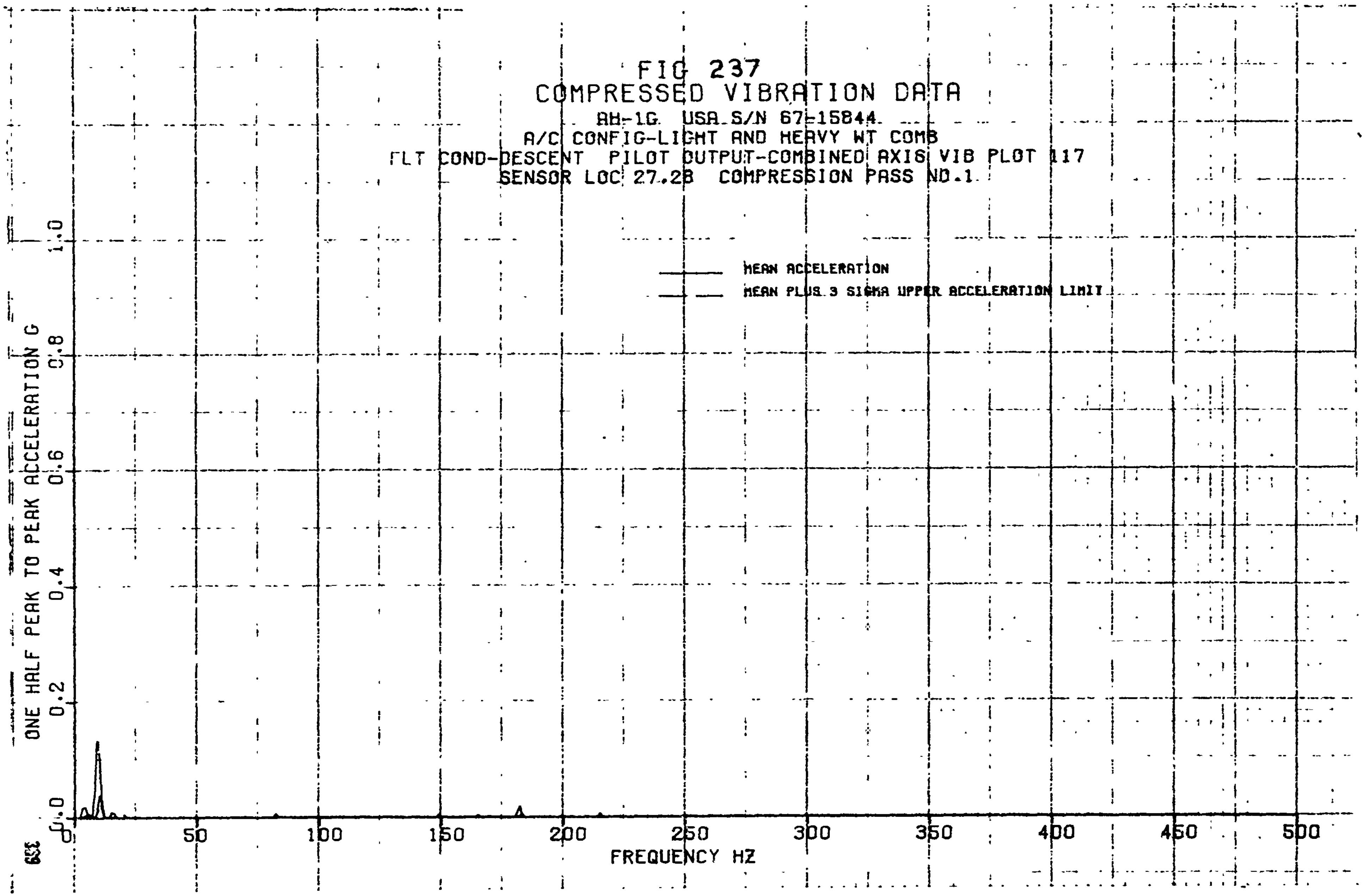


FIG 237
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-DESCENT PILOT OUTPUT-COMBINED AXIS VIB PLOT 117
SENSOR LOC 27.2B COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 238

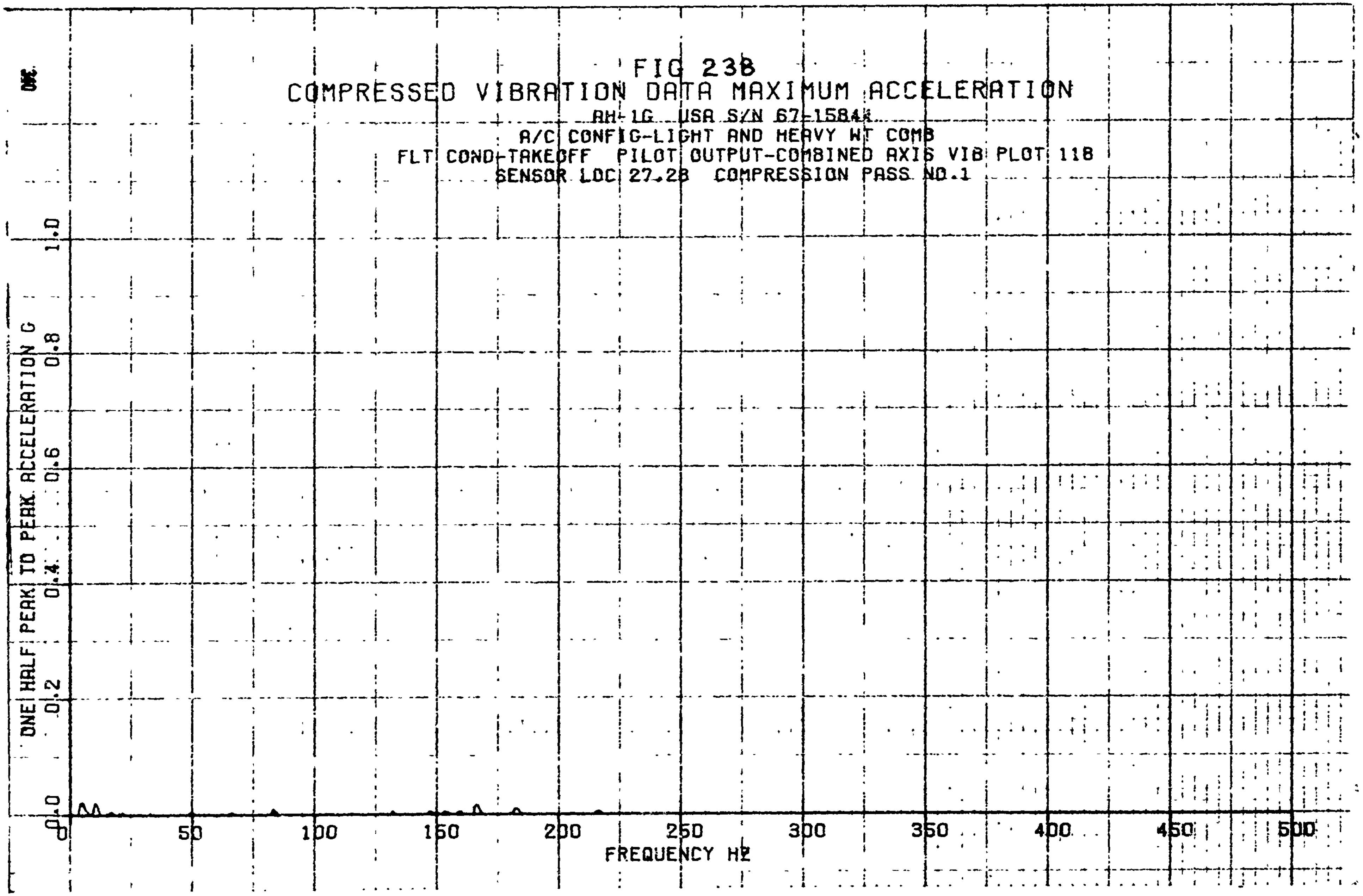
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-TAKEOFF PILOT OUTPUT-COMBINED AXIS VIB PLOT 118

SENSOR LOC 27.28 COMPRESSION PASS NO.1



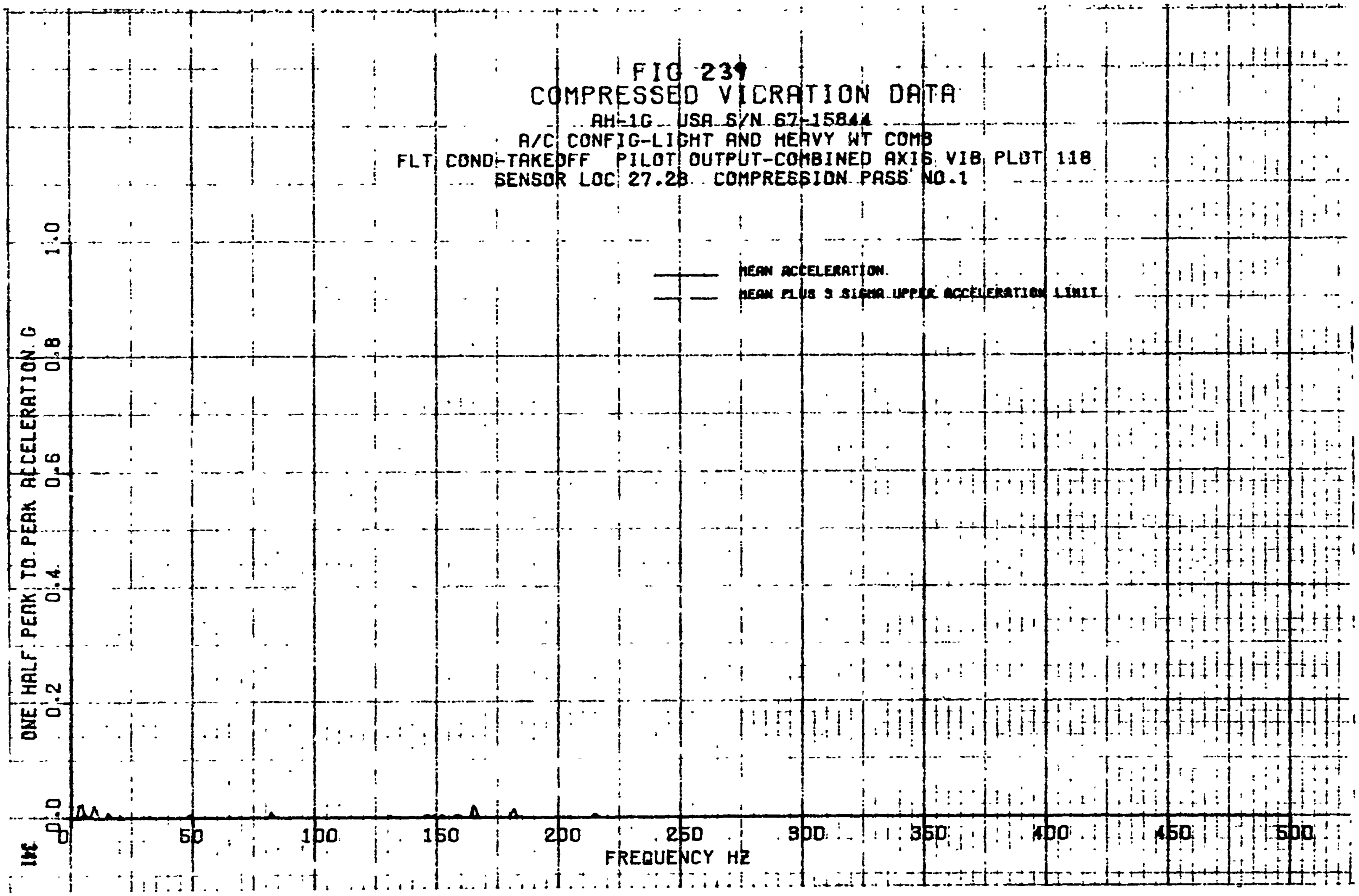


FIG 239
COMPRESSED VICRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-TAKEOFF PILOT OUTPUT-COMBINED AXIS VIB PLOT 118
SENSOR LOC 27.28 COMPRESSION PASS NO.1
MEAN ACCELERATION.
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 240

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-LANDING PILOT OUTPUT-COMBINED AXIS VIB PLOT 119

SENSOR LOC 27.2B COMPRESSION PASS N3.1

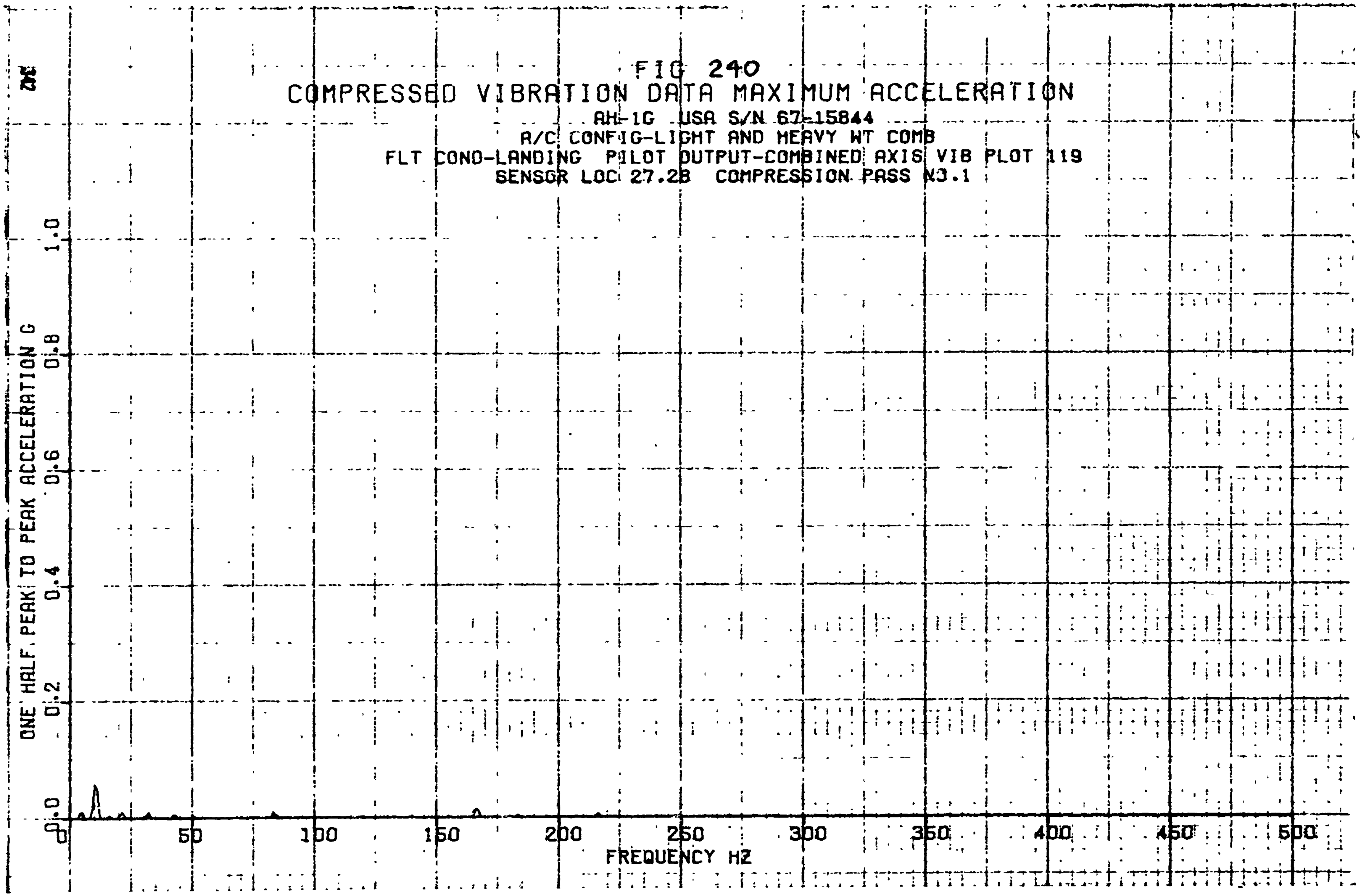
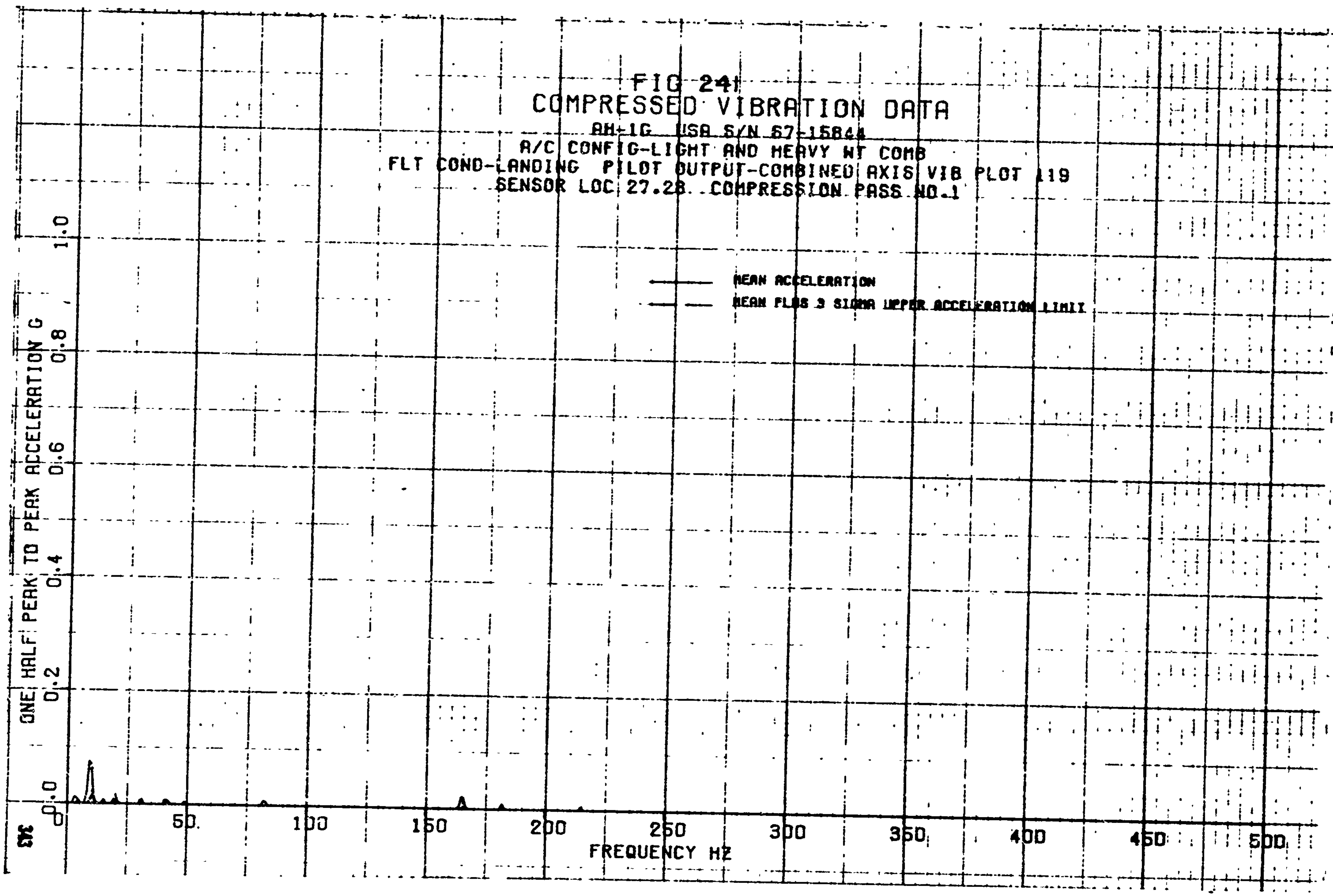


FIG 241
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-LANDING PILOT OUTPUT-COMBINED AXIS VIB PLOT 119
SENSOR LOC 27.28 COMPRESSION PASS NO.1



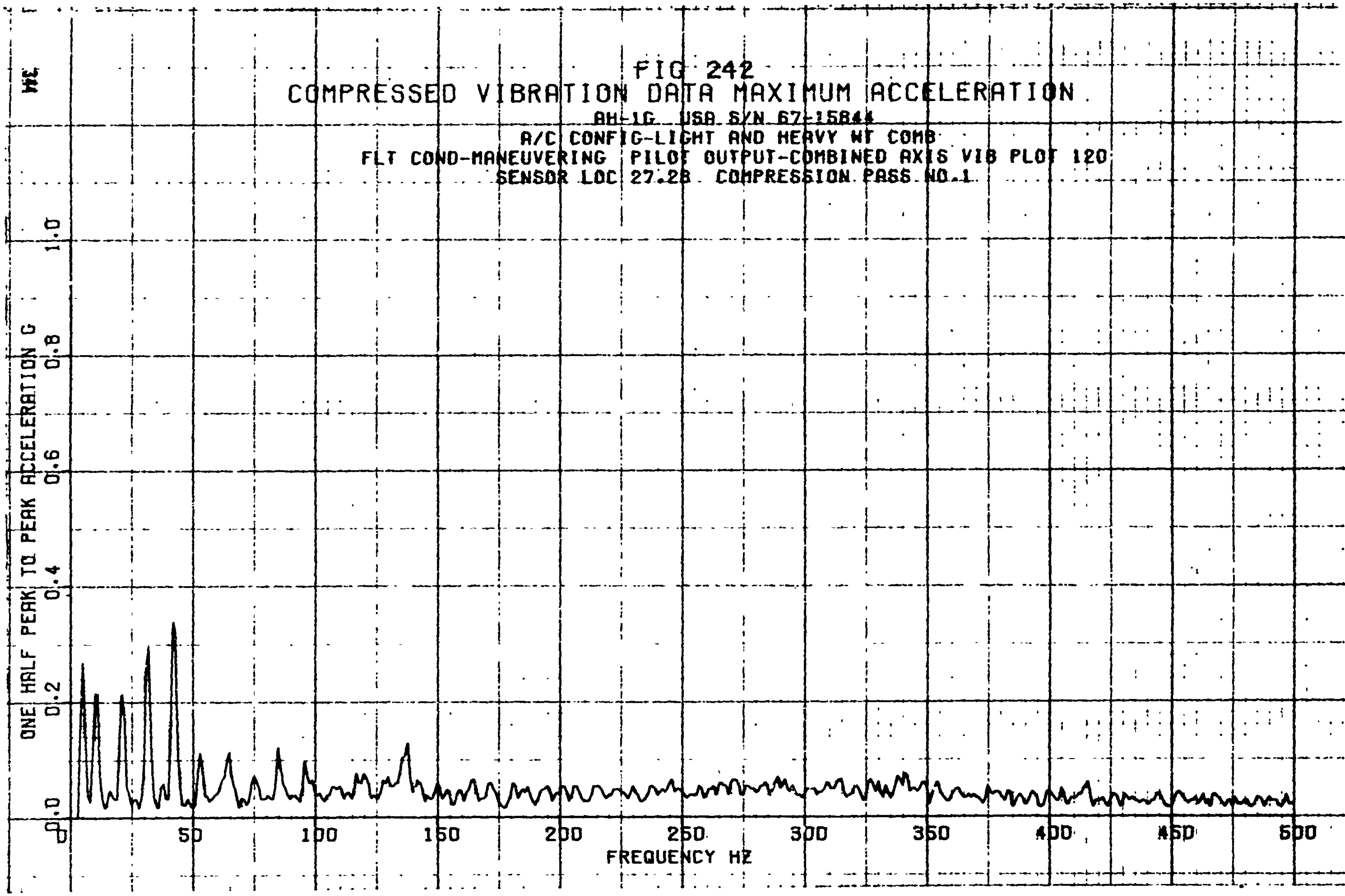


FIG 242
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-MANEUVERING PILOT OUTPUT-COMBINED AXIS VIB PLOT 120
SENSOR LOC 27.28 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

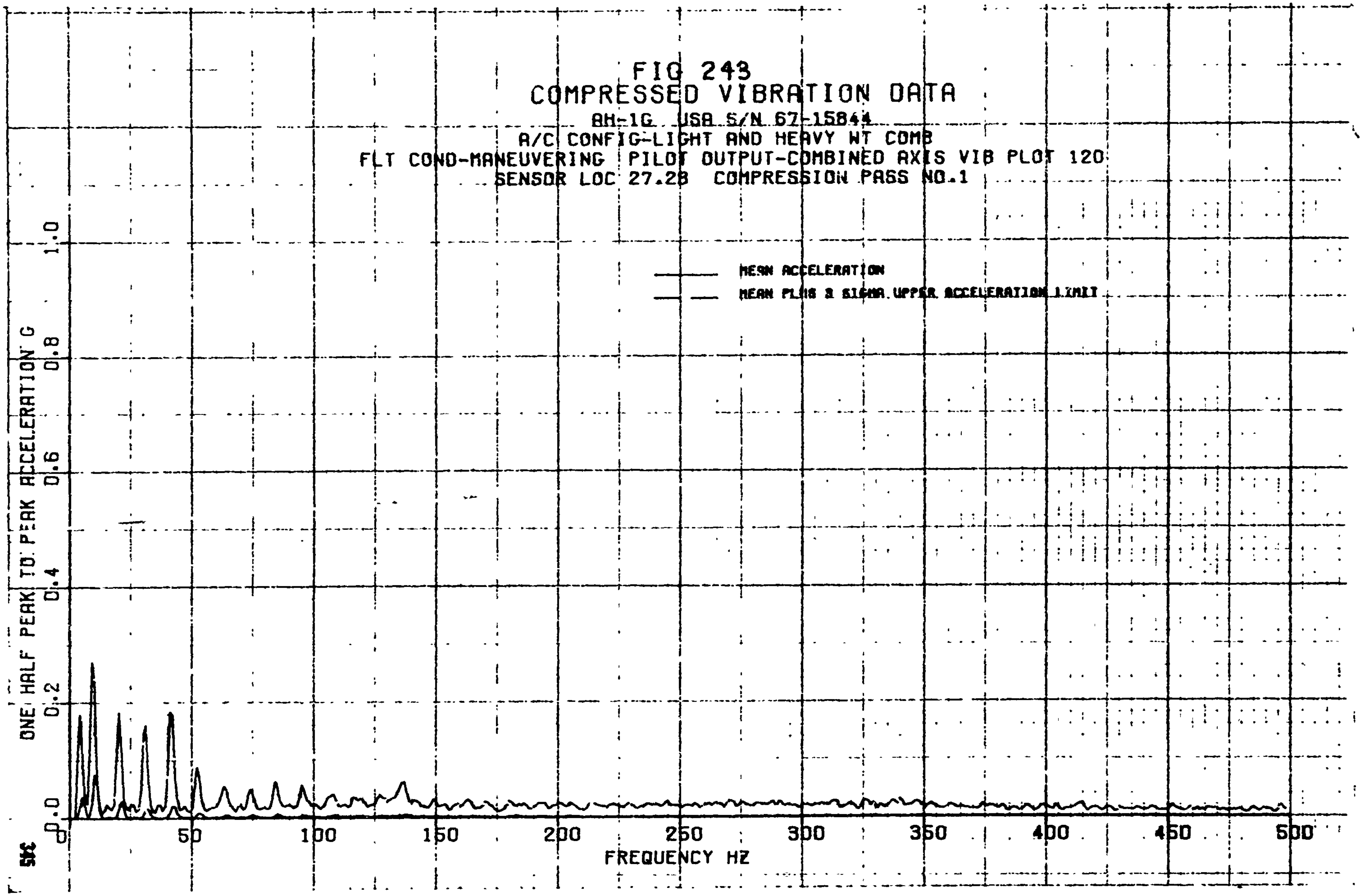


FIG 243
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-MANEUVERING PILOT OUTPUT-COMBINED AXIS VIB PLOT 120
SENSOR LOC 27.28 COMPRESSION PASS NO.1

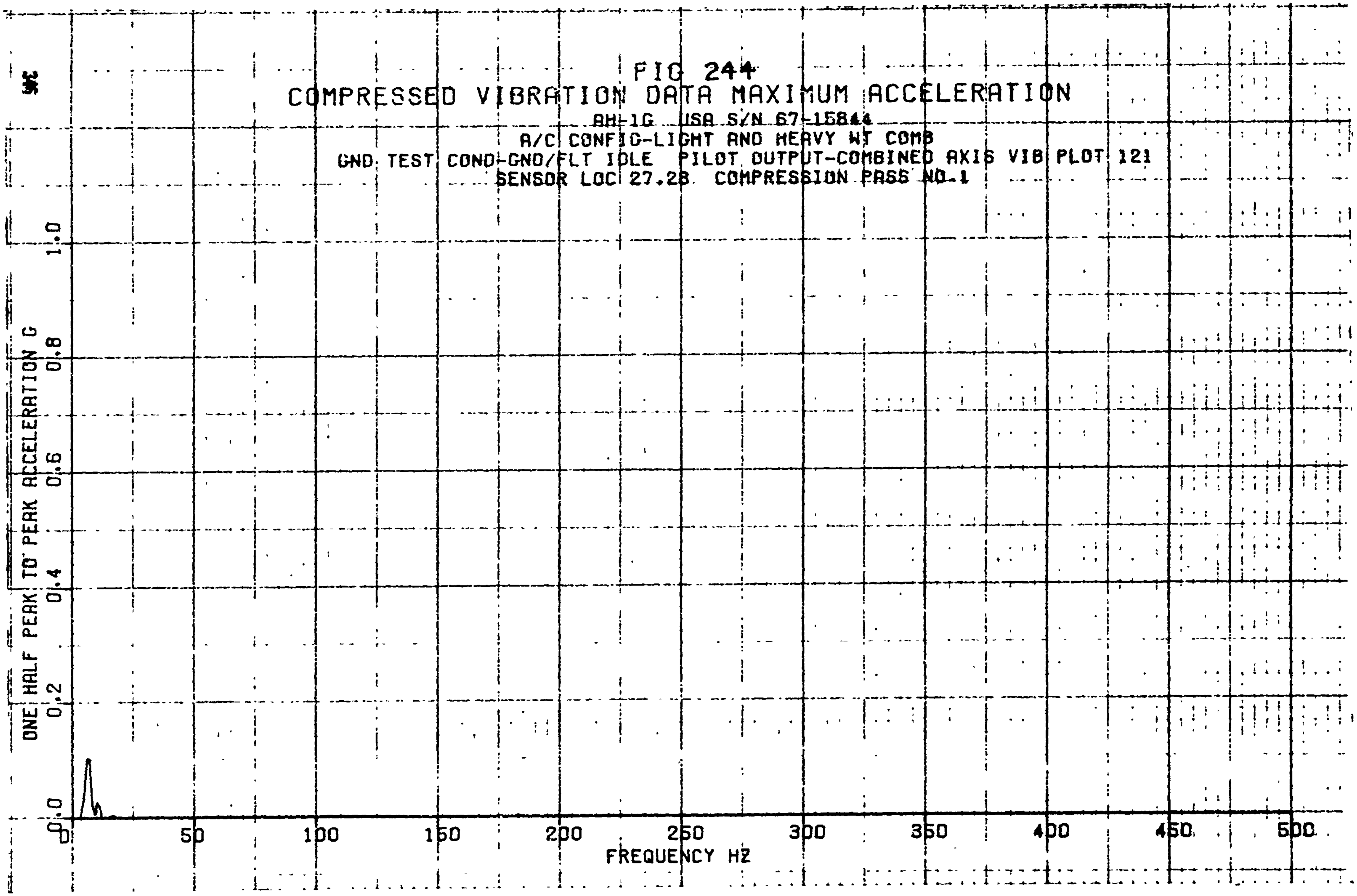


FIG 244
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
GND TEST COND-GND/FLT IDLE PILOT OUTPUT-COMBINED AXIS VIB PLOT 121
SENSOR LOC 27.28 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
250
300
350
400
450
500
FREQUENCY HZ

FIG 245

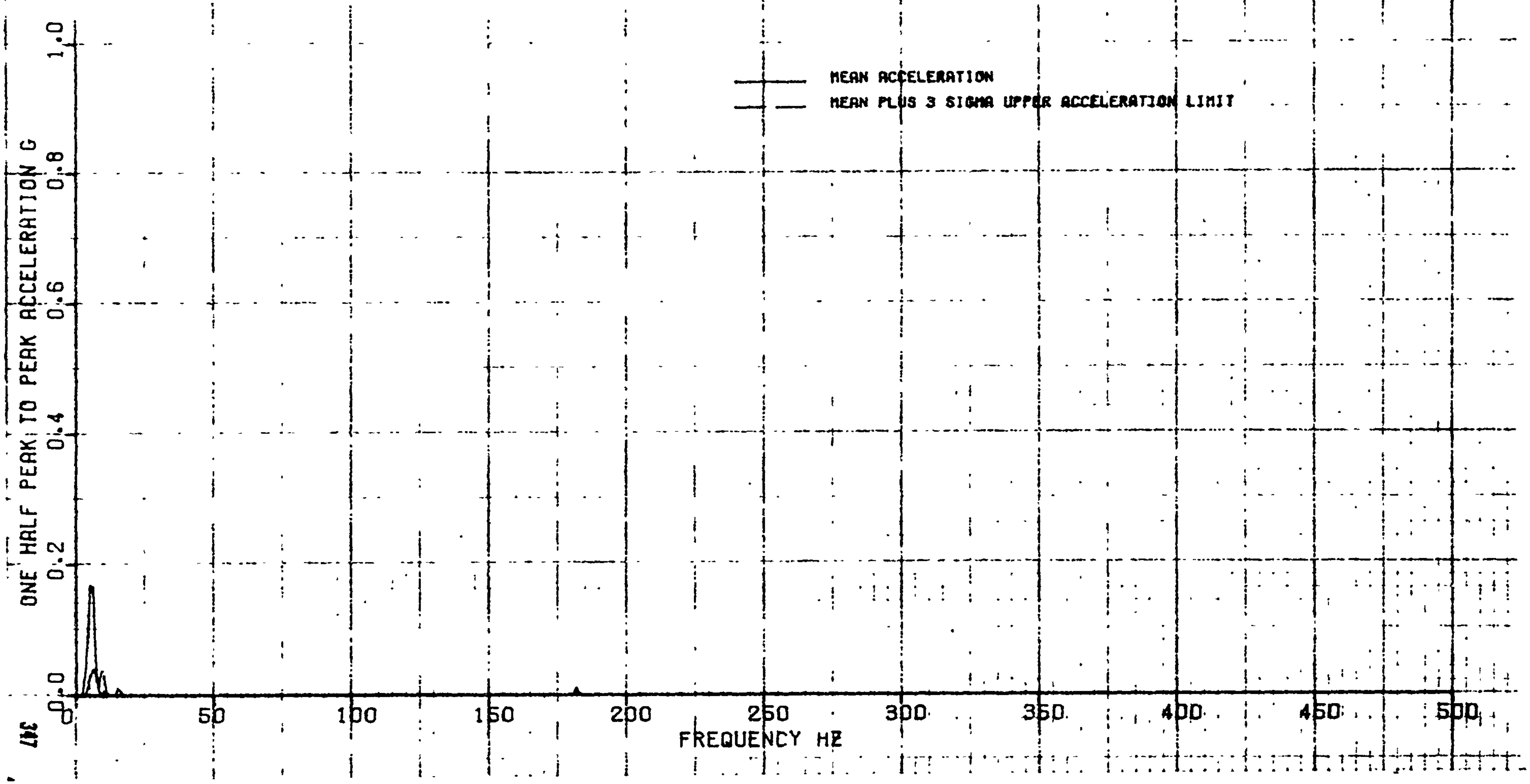
COMPRESSED VIBRATION DATA

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

GND TEST COND-GND/FLT IDLE PILOT OUTPUT-COMBINED AXIS VIB PLOT 121

SENSOR LOC 27.2B COMPRESSION PASS NO.1



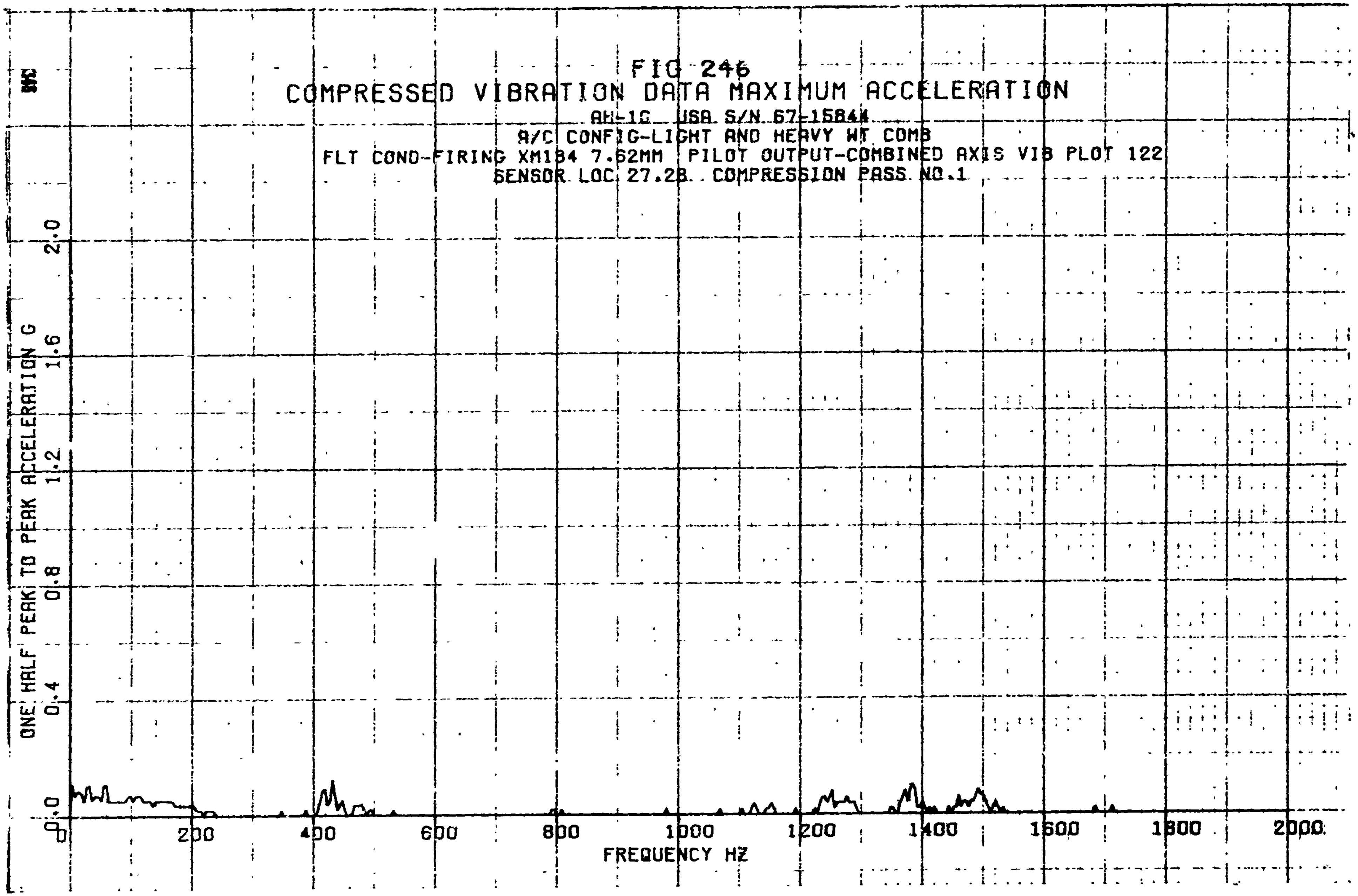


FIG 246
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM134 7.62MM PILOT OUTPUT-COMBINED AXIS VIB PLOT 122
SENSOR LOC 27.2B COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

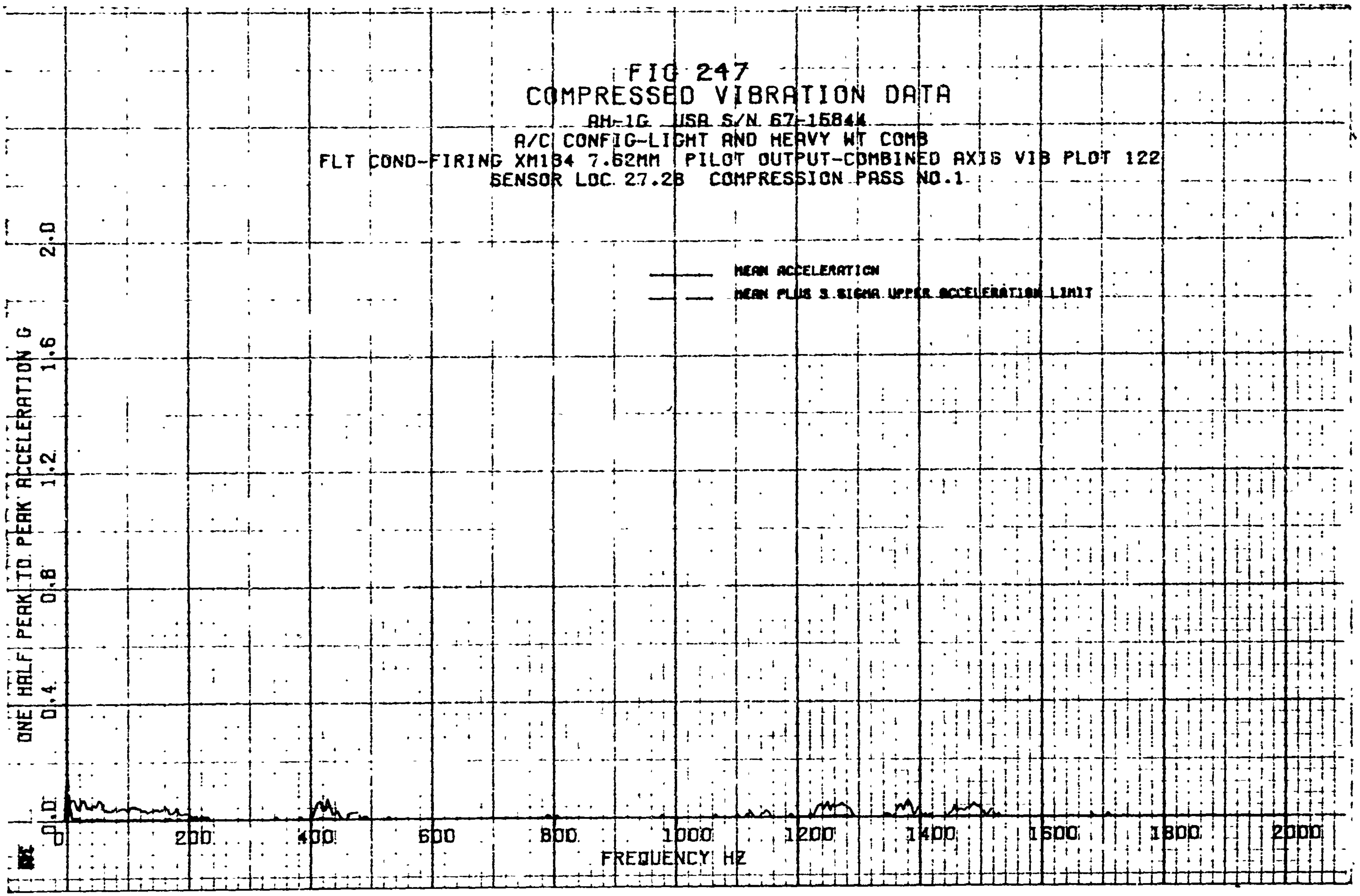


FIG 247
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM134 7.62MM PILOT OUTPUT-COMBINED AXIS VIB PLOT 122
SENSOR LOC 27.2B COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

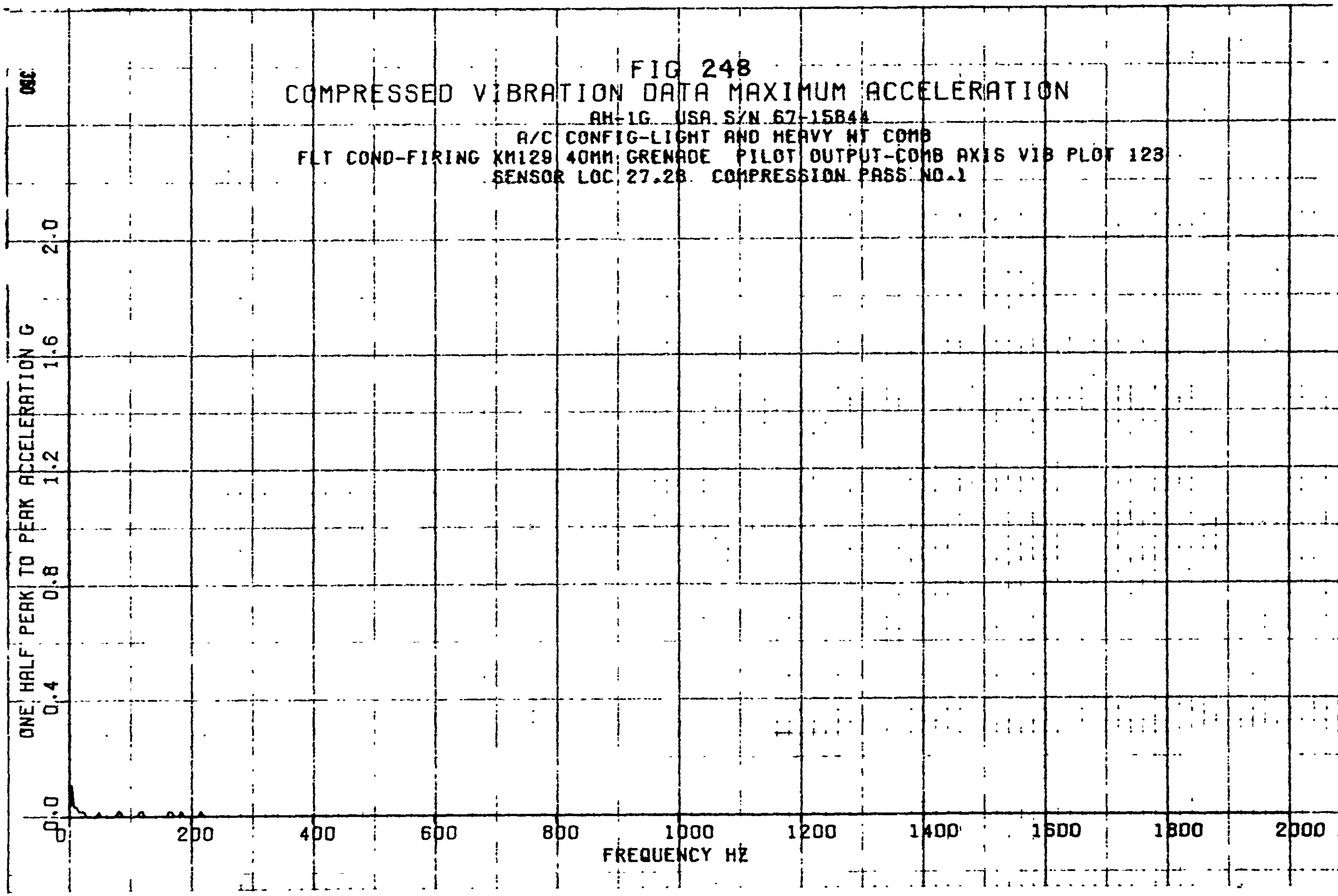


FIG 248
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM129 40MM GRENADE PILOT OUTPUT-COMB AXIS VIB PLOT 123
SENSOR LOC 27.28 COMPRESSION PASS NO.1
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

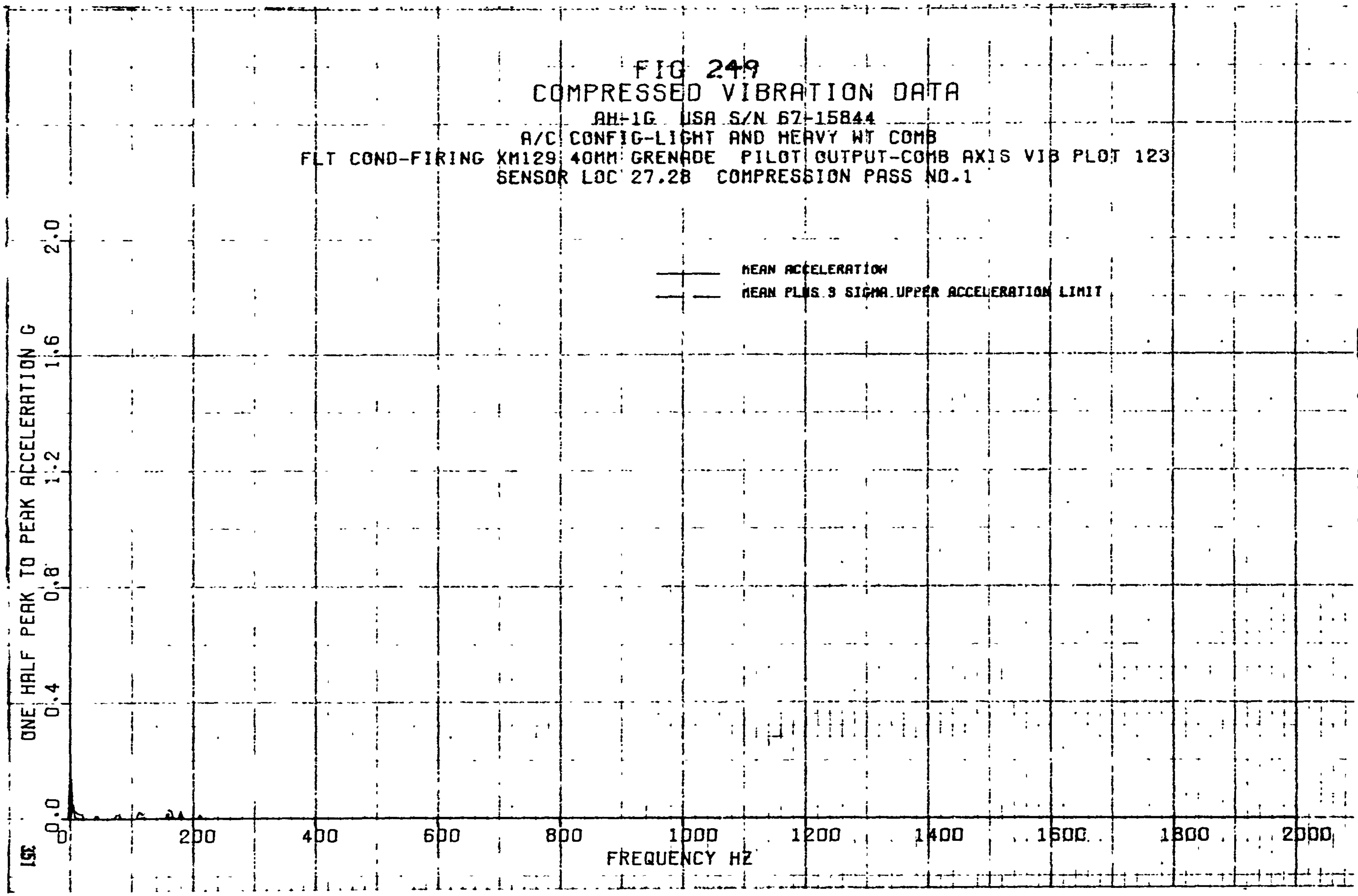


FIG 249
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM129 40MM GRENADE PILOT OUTPUT-COMB AXIS VIB PLOT 123
SENSOR LOC 27.28 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 250

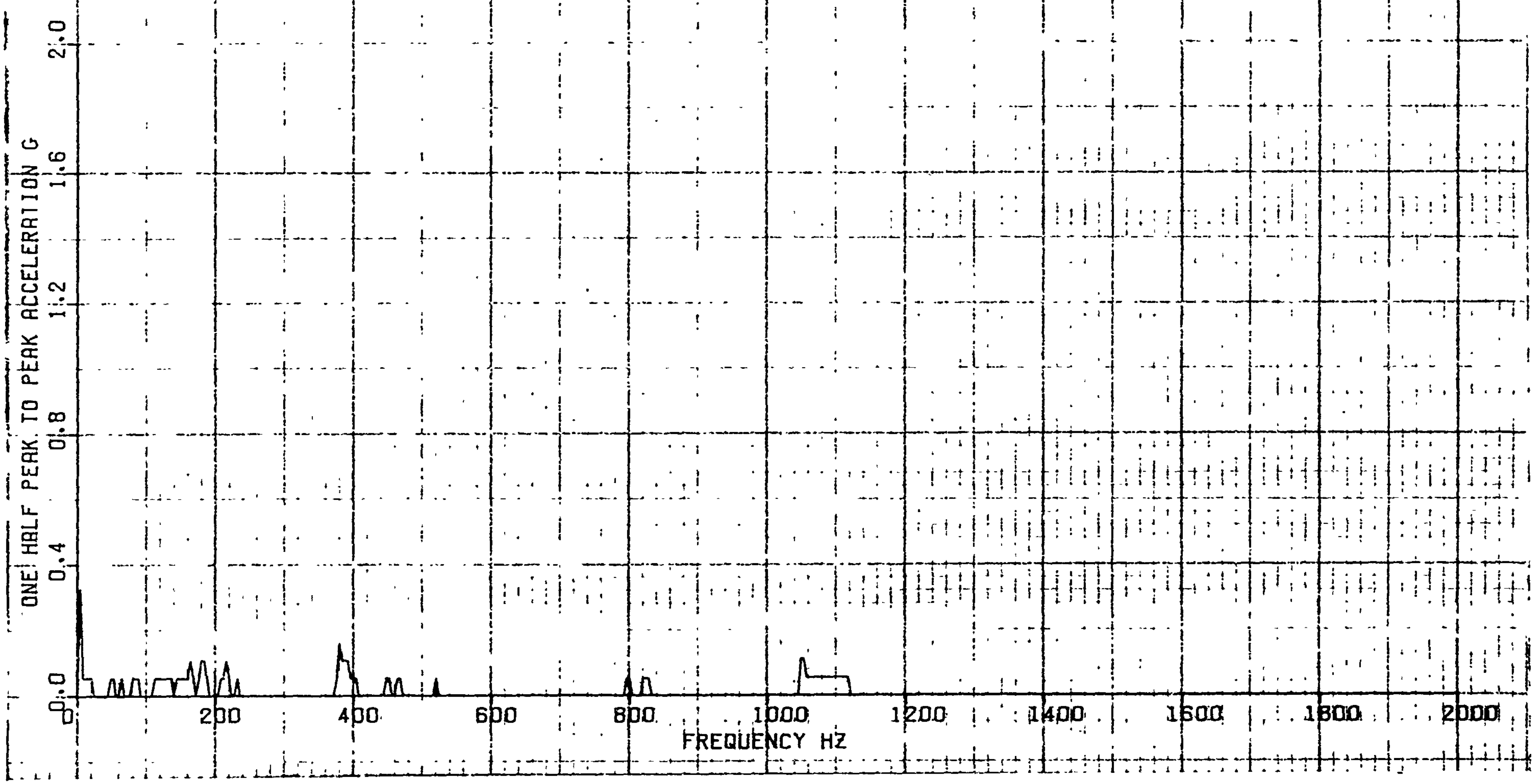
COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844

A/C CONFIG-LIGHT AND HEAVY WT COMB

FLT COND-FIRING XM35 20MM PILOT OUTPUT-COMBINED AXIS VIB PLOT 125

SENSOR LOC 27.2B COMPRESSION PASS NO.1



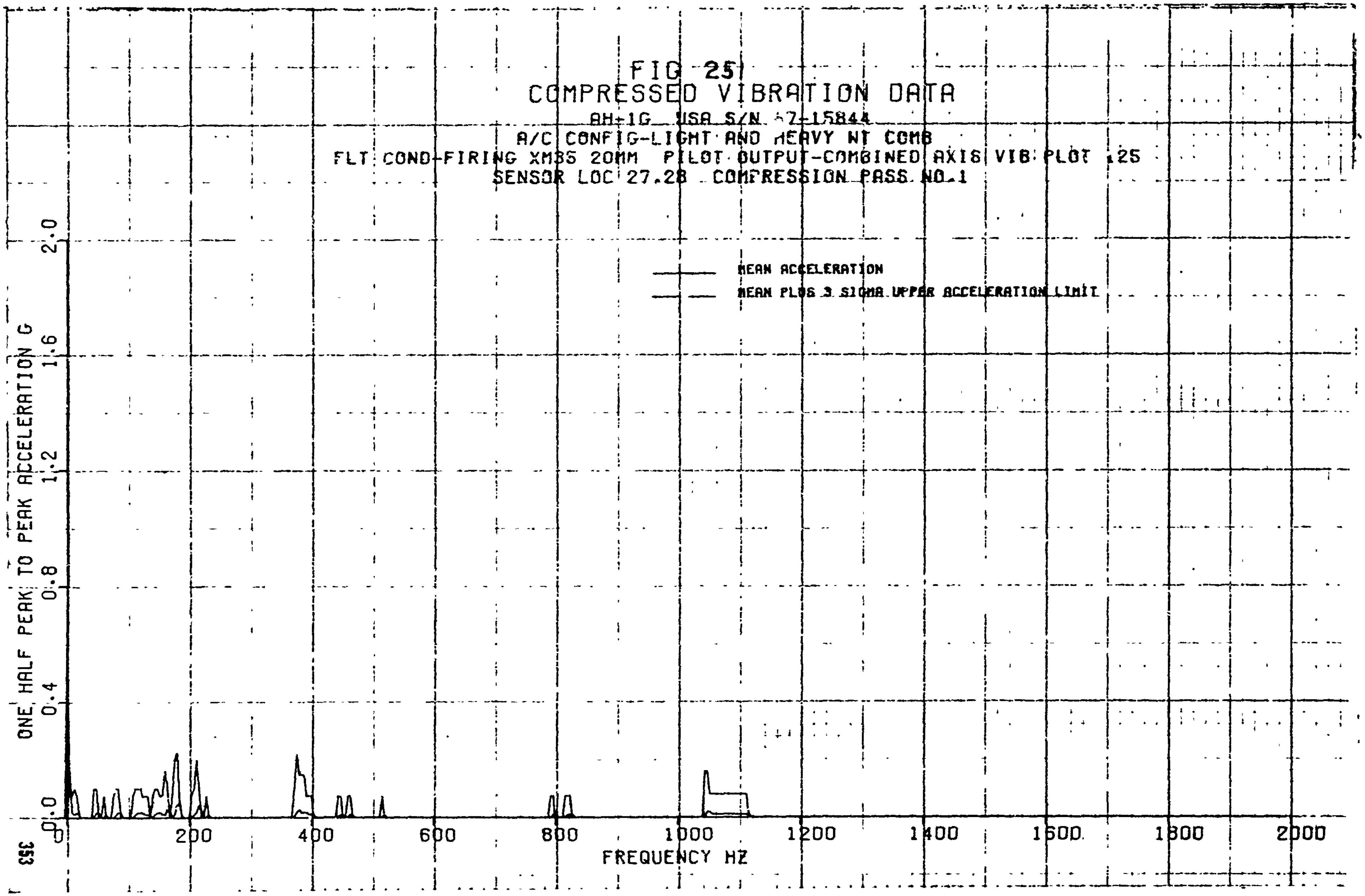
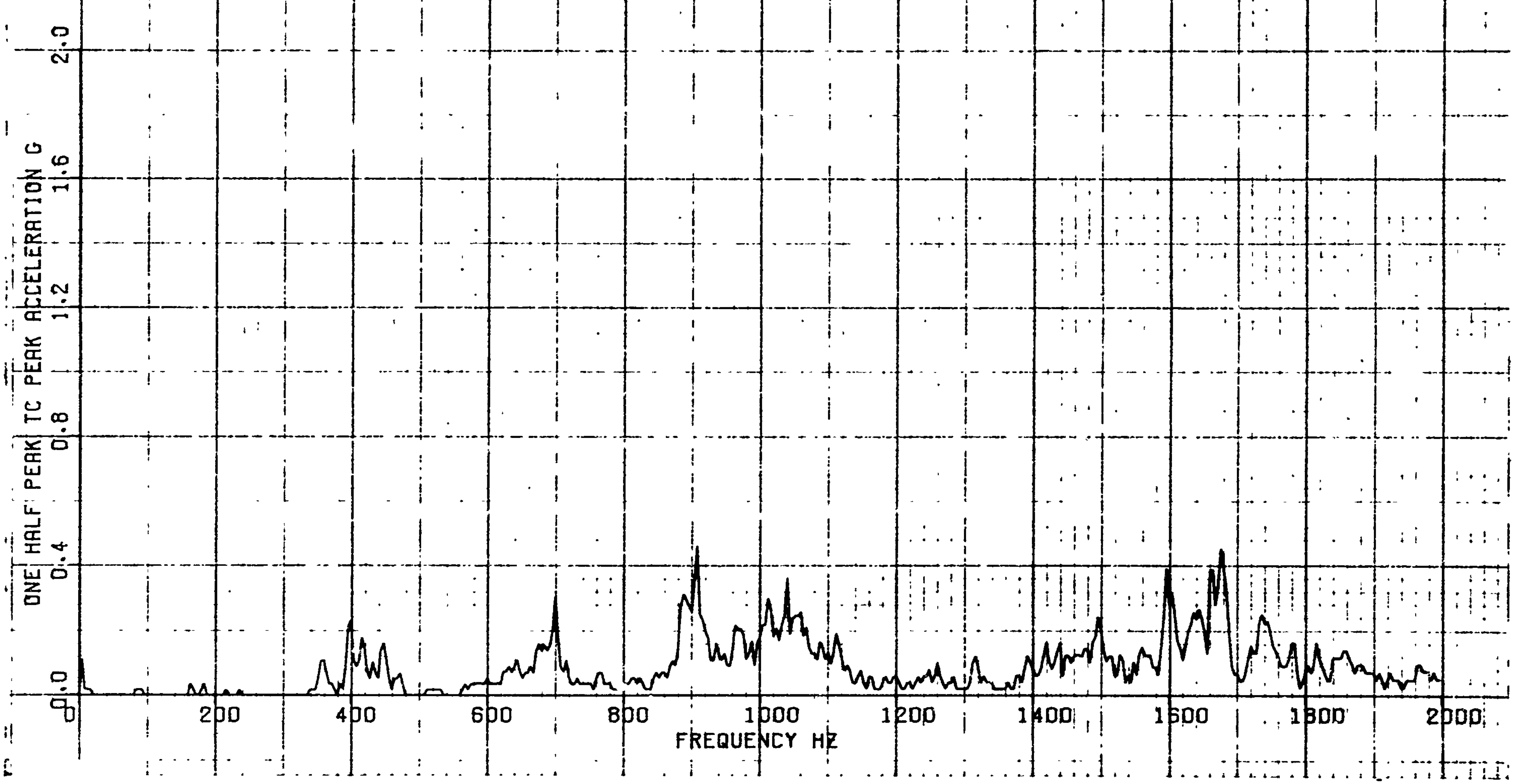


FIG 25
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM35 20MM PILOT OUTPUT-COMBINED AXIS VIB PLOT .25
SENSOR LOC 27.28 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ

FIG 252

COMPRESSED VIBRATION DATA MAXIMUM ACCELERATION

AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM159 2.75FFAR PILOT OUTPUT-COMBINED AXIS VIB PLOT 126
SENSOR LOC 27.28 COMPRESSION PASS NO.1



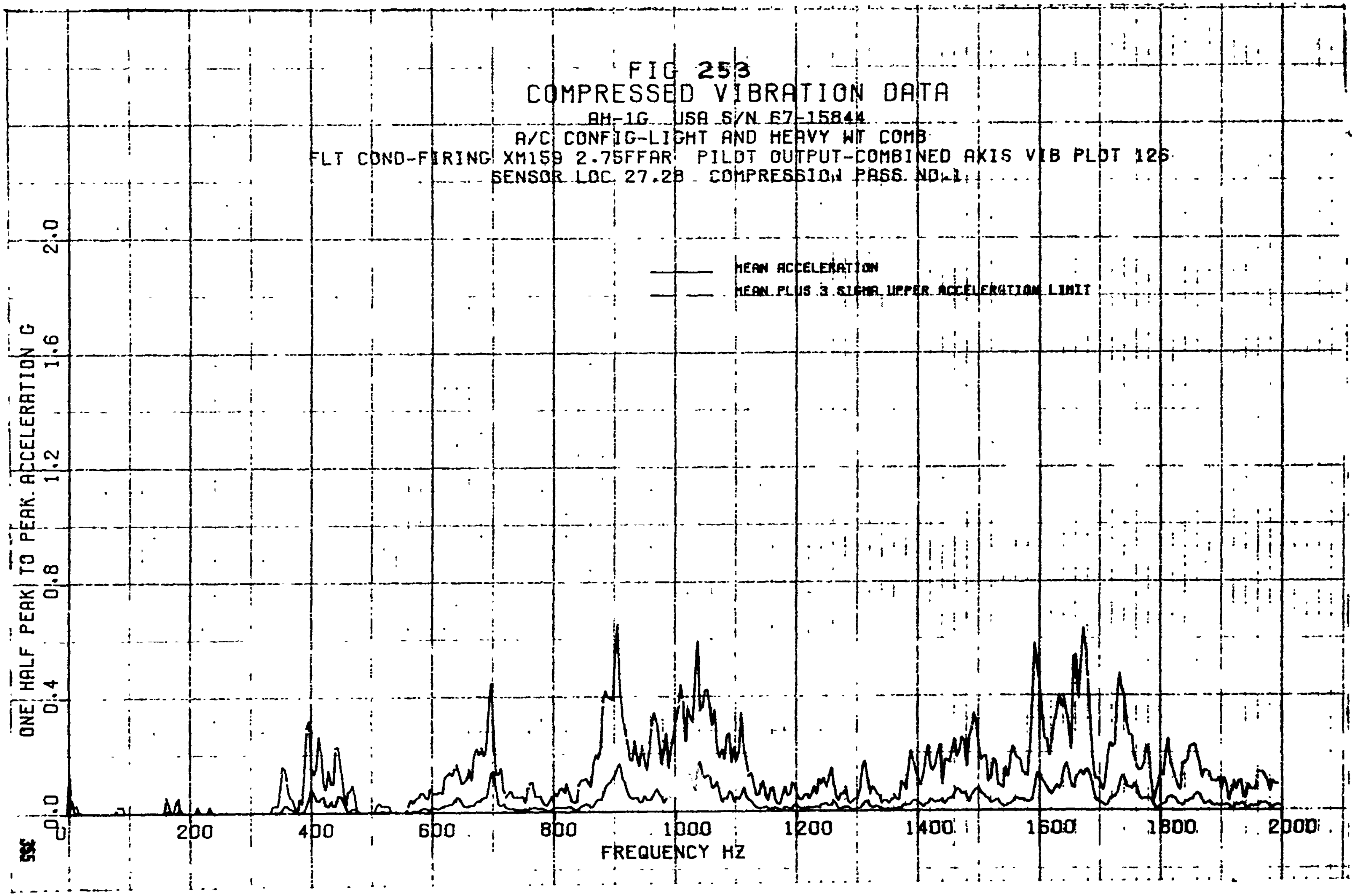
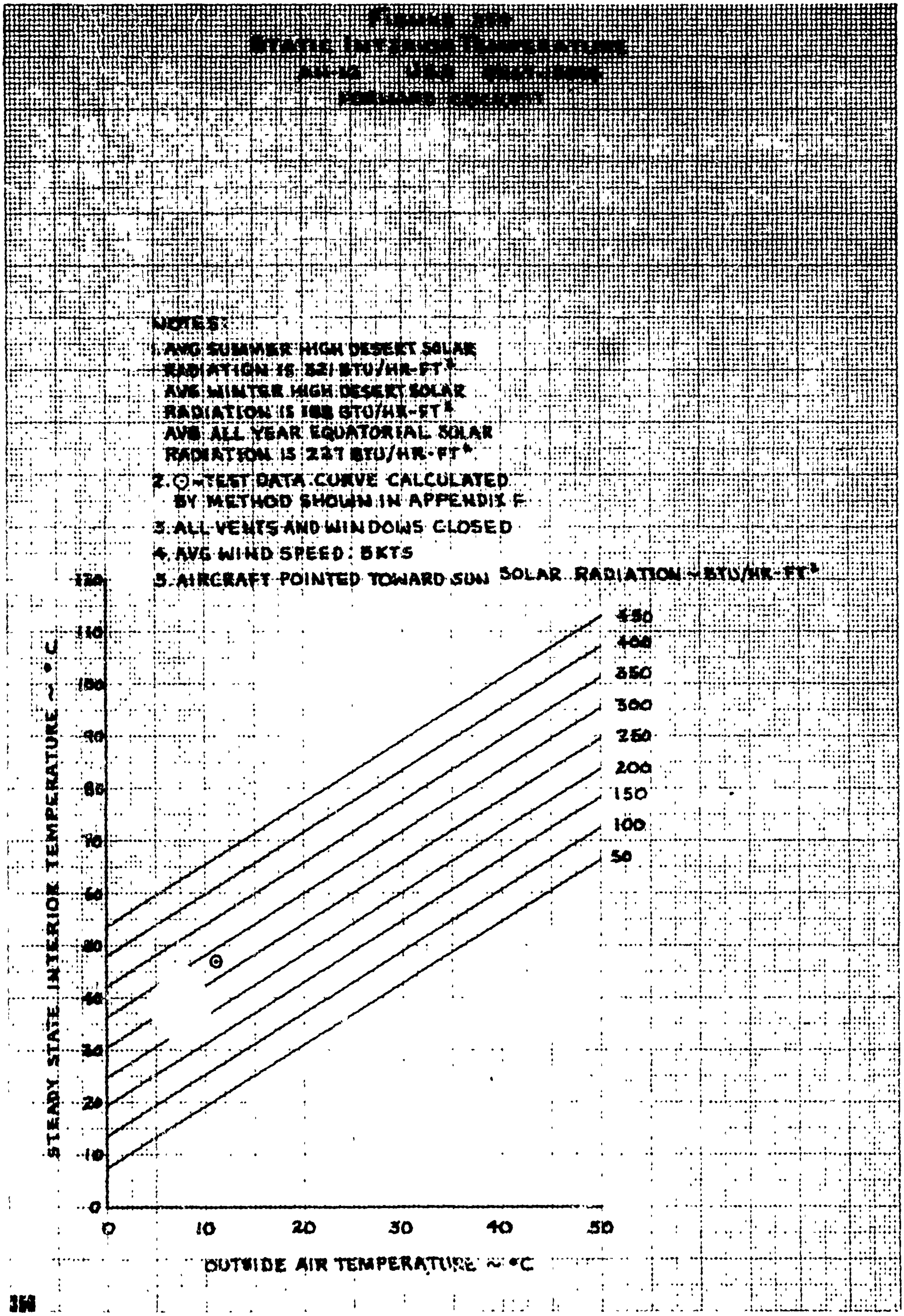


FIG 253
COMPRESSED VIBRATION DATA
AH-1G USA S/N 67-15844
A/C CONFIG-LIGHT AND HEAVY WT COMB
FLT COND-FIRING XM159 2.75FFAR PILOT OUTPUT-COMBINED AXIS VIB PLOT 126
SENSOR LOC 27.28 COMPRESSION PASS NO.1
MEAN ACCELERATION
MEAN PLUS 3 SIGMA UPPER ACCELERATION LIMIT
ONE HALF PEAK TO PEAK ACCELERATION G
0.0
0.4
0.8
1.2
1.6
2.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
FREQUENCY HZ


NOTES:
1. AVG SUMMER HIGH DESERT SOLAR RADIATION IS 321 BTU/HR-FT²
AVG WINTER HIGH DESERT SOLAR RADIATION IS 188 BTU/HR-FT²
AVG ALL YEAR EQUATORIAL SOLAR RADIATION IS 227 BTU/HR-FT²
2. ⊙-TEST DATA CURVE CALCULATED BY METHOD SHOWN IN APPENDIX F
3. ALL VENTS AND WINDOWS CLOSED
4. AVG WIND SPEED: 5KTS
5. AIRCRAFT POINTED TOWARD SUN
SOLAR RADIATION ~ BTU/HR-FT²
450
400
350
300
250
200
150
100
50
STEADY STATE INTERIOR TEMPERATURE ~ °C
OUTSIDE AIR TEMPERATURE ~ °C
0
10
20
30
40
50
60
70
80
90
100
110
120

[illegible]

NOTES:

1. AVG SUMMER HIGH DESERT SOLAR RADIATION IS 321 BTU/HR-FT²
   AVG WINTER HIGH DESERT SOLAR RADIATION IS 198 BTU/HR-FT²
   AVG ALL YEAR EQUATORIAL SOLAR RADIATION IS 227 BTU/HR-FT²
2. ⊙ = TEST DATA. CURVES CALCULATED BY METHOD SHOWN IN APPENDIX F
3. ALL VENTS AND WINDOWS CLOSED
4. AVG WIND SPEED 5 KTS
5. AIRCRAFT POINTED TOWARD SUN

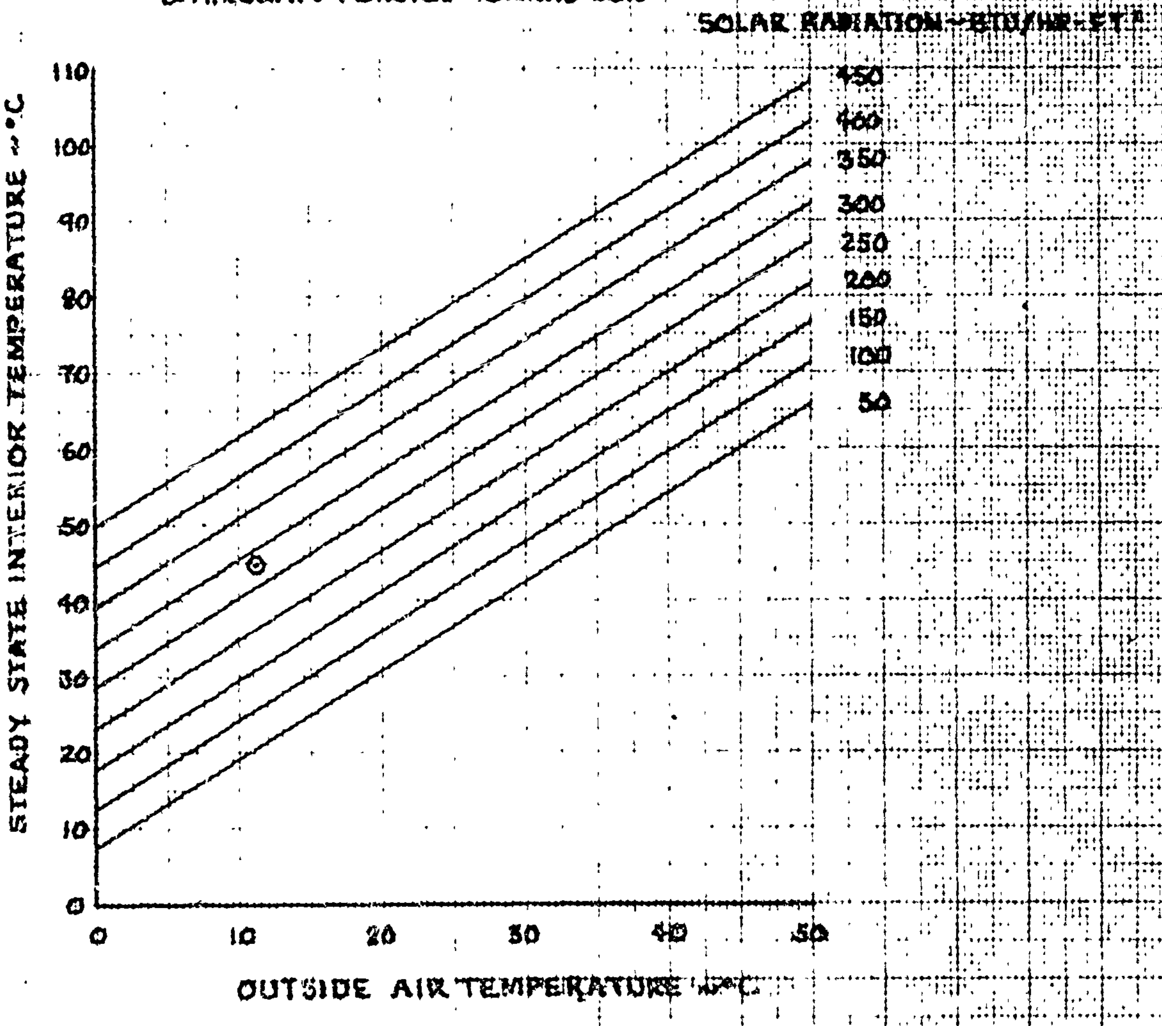


FIGURE [illegible]
STATIC INTERIOR TEMPERATURE
AH-1G USA S/N 67-15[illegible]
PILOT INSTRUMENT PANEL

NOTES:

1. AVG SUMMER HIGH DESERT SOLAR RADIATION IS 321 BTU/HR-FT^2
   AVG WINTER HIGH DESERT SOLAR RADIATION IS 188 BTU/HR-FT^2
   AVG ALL YEAR EQUATORIAL SOLAR RADIATION IS 227 BTU/HR-FT^2
2. ⊙ ~ TEST DATA. CURVES CALCULATED BY METHOD SHOWN IN APPENDIX F
3. ALL VENTS AND WINDOWS CLOSED
4. AVERAGE WIND SPEED: 5 KTS
5. AIRCRAFT POINTED TOWARD SUN

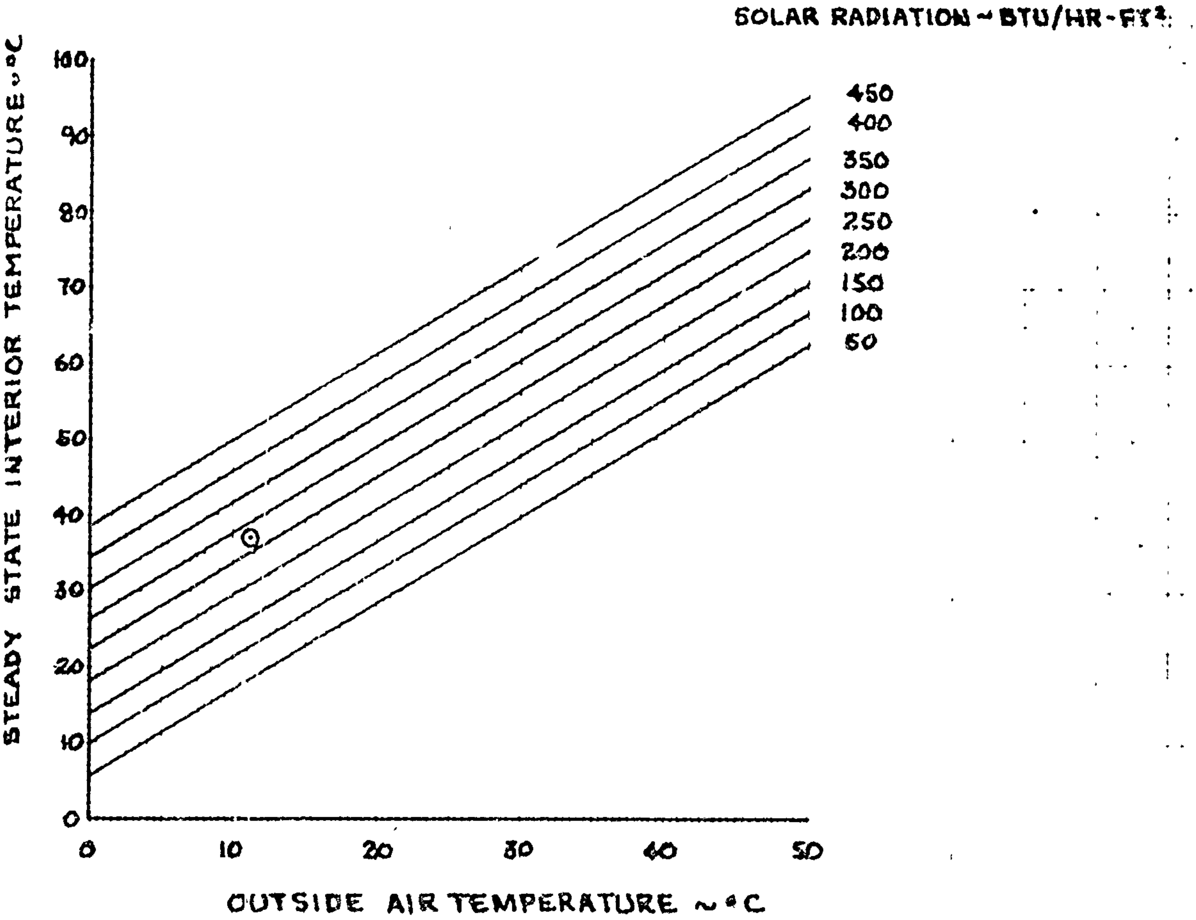


FIGURE [illegible]
STATIC INTERIOR TEMPERATURE
[illegible]
[illegible]

NOTES:

1. AVG SUMMER HIGH DESERT SOLAR RADIATION IS 321 BTU/HR-FT²
   AVG WINTER HIGH DESERT SOLAR RADIATION IS 188 BTU/HR-FT²
   AVG ALL YEAR EQUATORIAL SOLAR RADIATION IS 227 BTU/HR-FT²
2. ⊙ - TEST DATA. CURVES CALCULATED BY METHOD SHOWN IN APPENDIX F
3. ALL VENTS AND WINDOWS CLOSED
4. AVG WIND SPEED: 5 KTS
5. AIRCRAFT POINTED TOWARD SUN

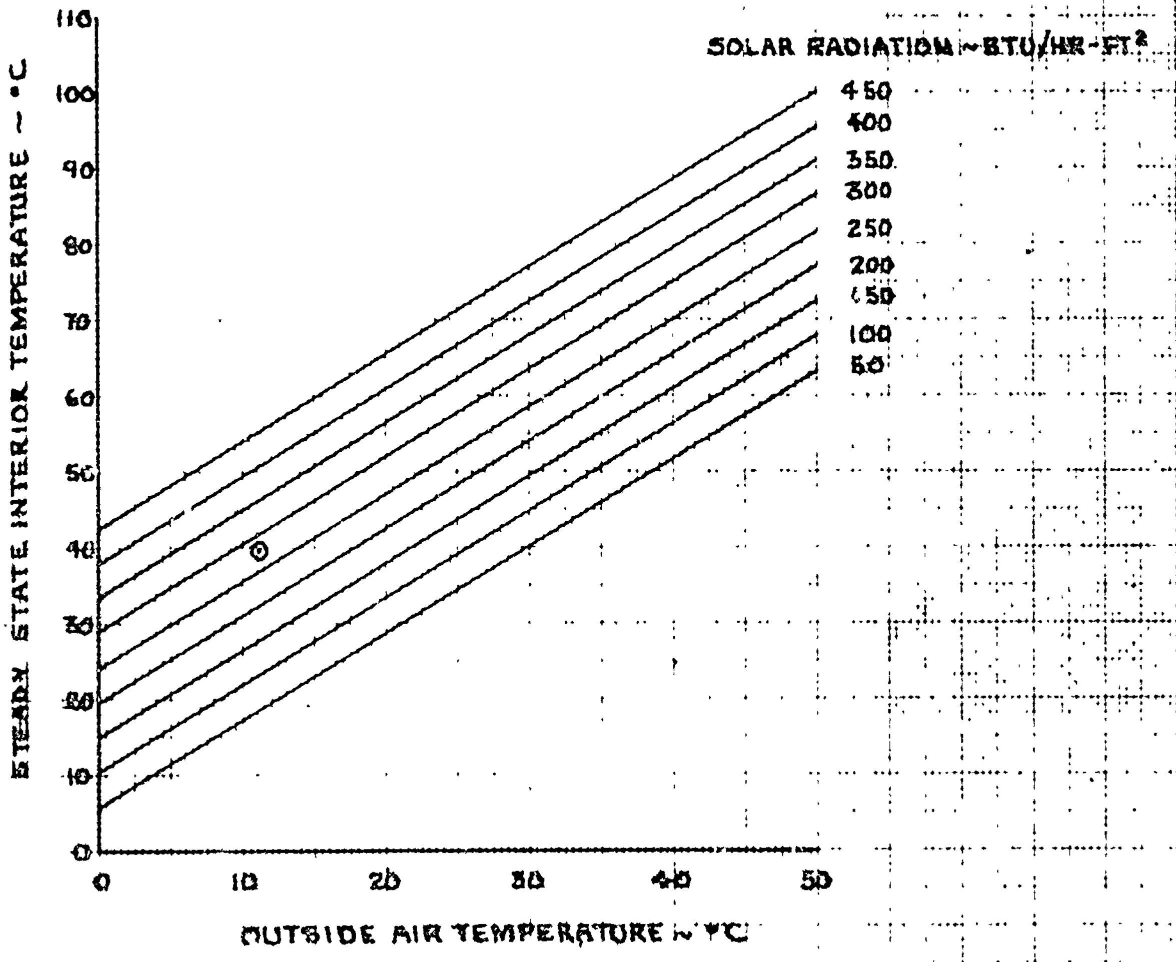


FIGURE 2[illegible]
STATIC INTERIOR TEMPERATURE
AH-1G USA [illegible]67-15844
AFT AVIONICS

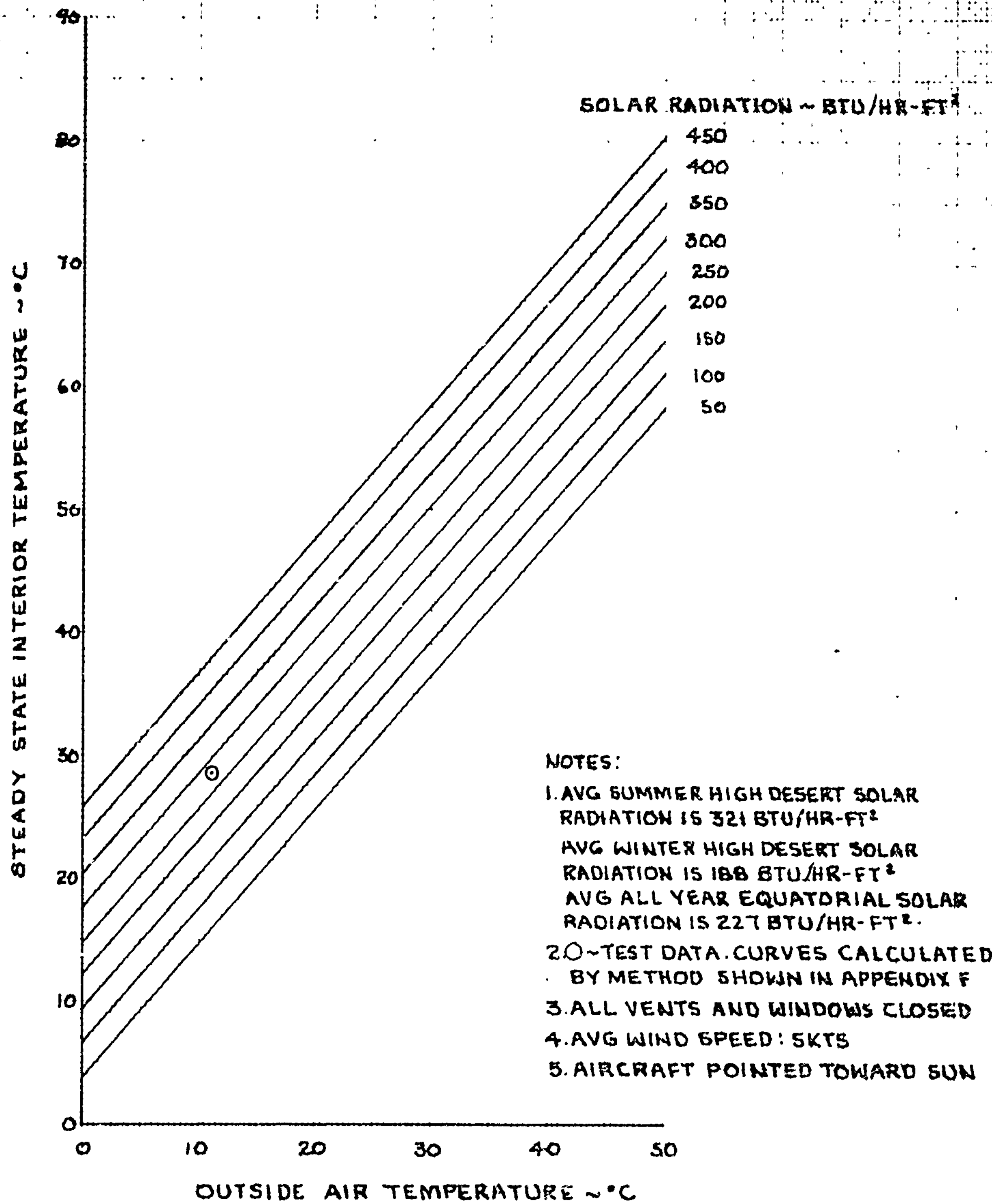


FIGURE [illegible]
STATIC INTERIOR TEMPERATURE
AH-1G USA S/N 67-15[illegible]
TAIL ROTOR 42 DEGREE GEARBOX

NOTES:

1. AVG SUMMER HIGH DESERT SOLAR RADIATION IS 321 BTU/HR-FT²
   AVG WINTER HIGH DESERT SOLAR RADIATION IS 188 BTU/HR-FT²
   AVG ALL YEAR EQUATORIAL SOLAR RADIATION IS 227 BTU/HR-FT²
2. ⊙ ~ TEST DATA. CURVES CALCULATED BY METHOD SHOWN IN APPENDIX F
3. ALL VENTS AND WINDOWS CLOSED
4. AVG WIND SPEED: 5KTS
5. AIRCRAFT POINTED TOWARD SUN

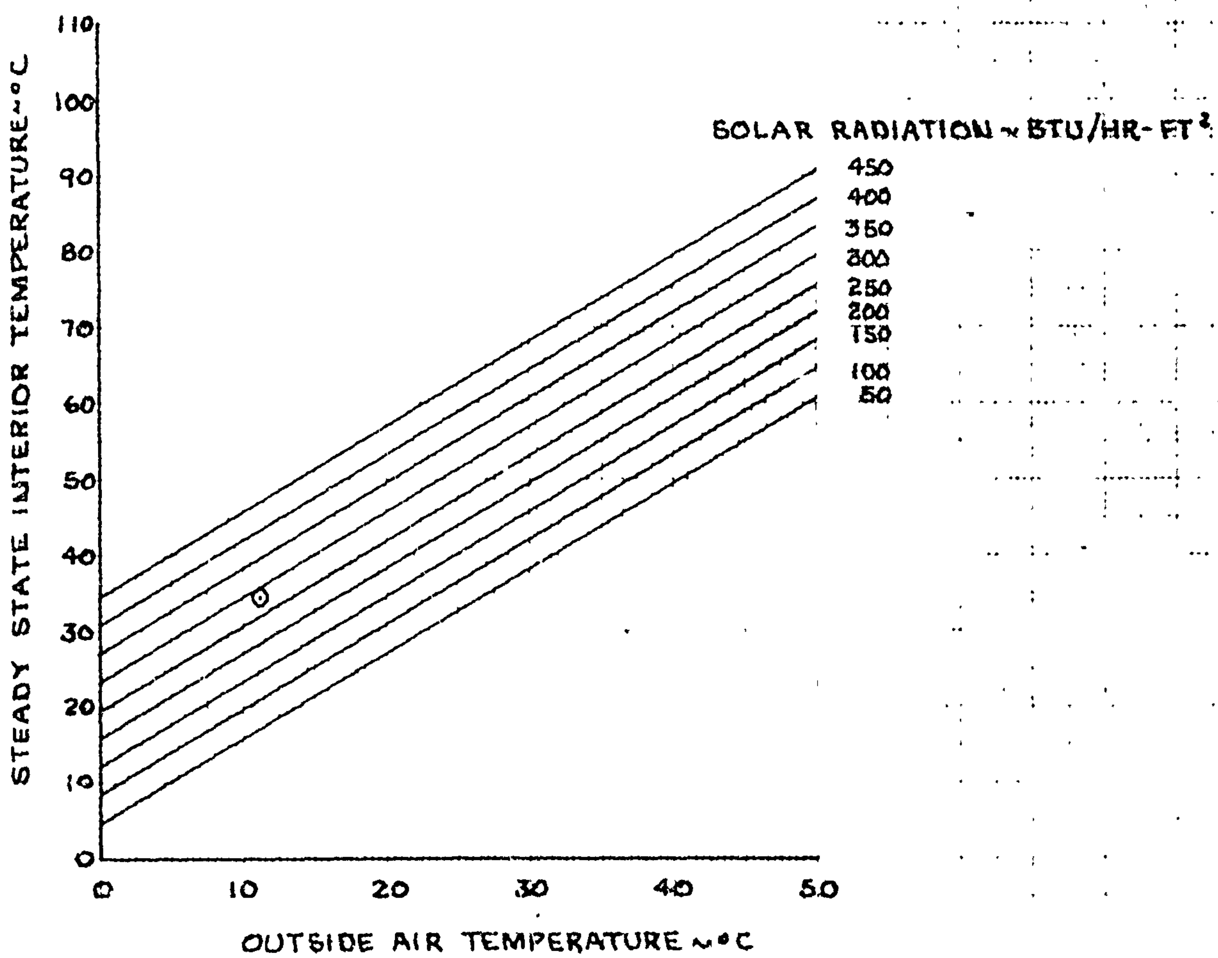


FIGURE 209

STATIC INTERIOR TEMPERATURE

AH-1G USA S/N 67-15844

TAIL ROTOR 90 DEGREE GEARBOX

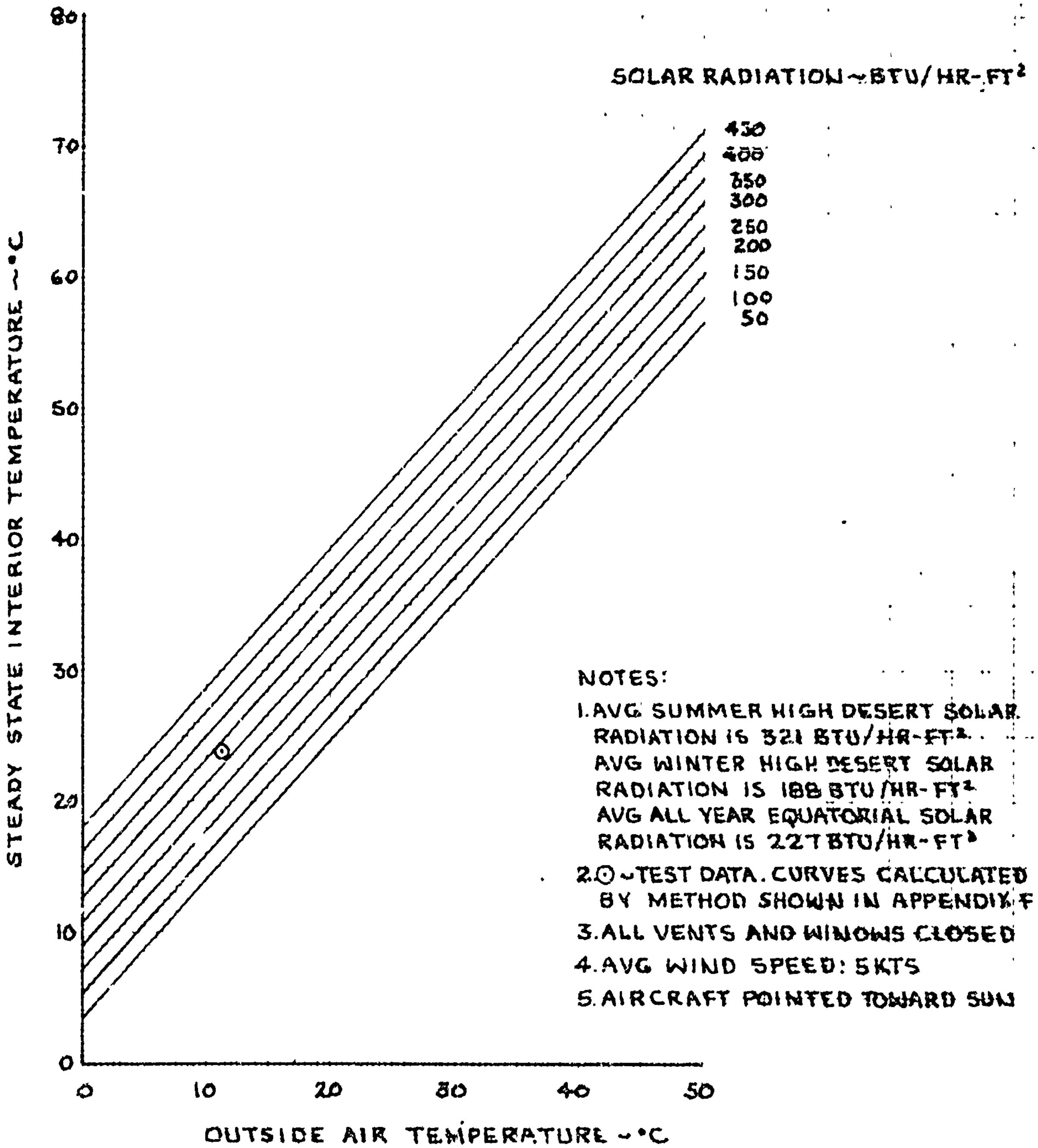


Figure 261
Static Interior Temperature
AH-1G USA S/N 67-15844
Hanger Bearing Number 2

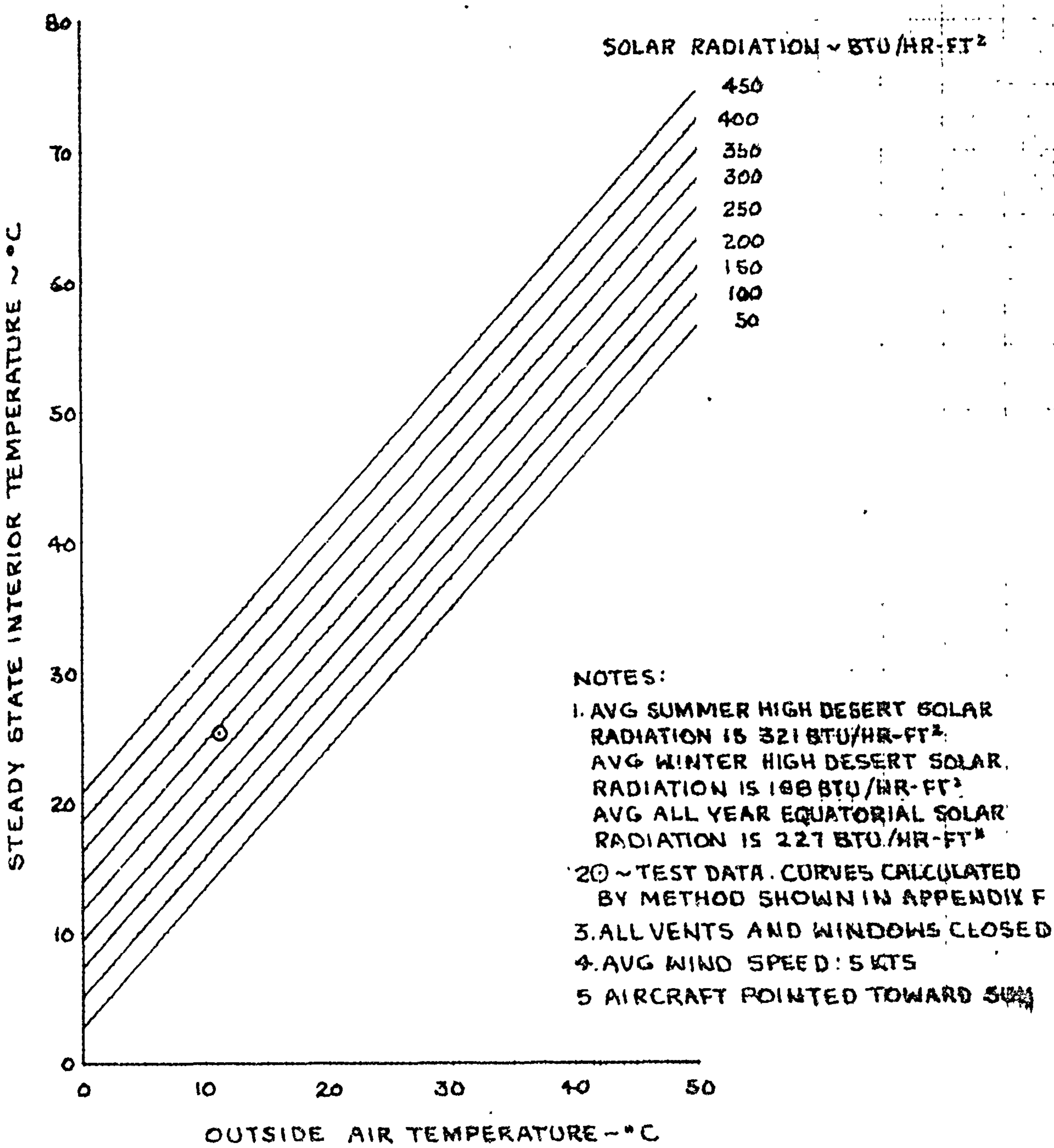
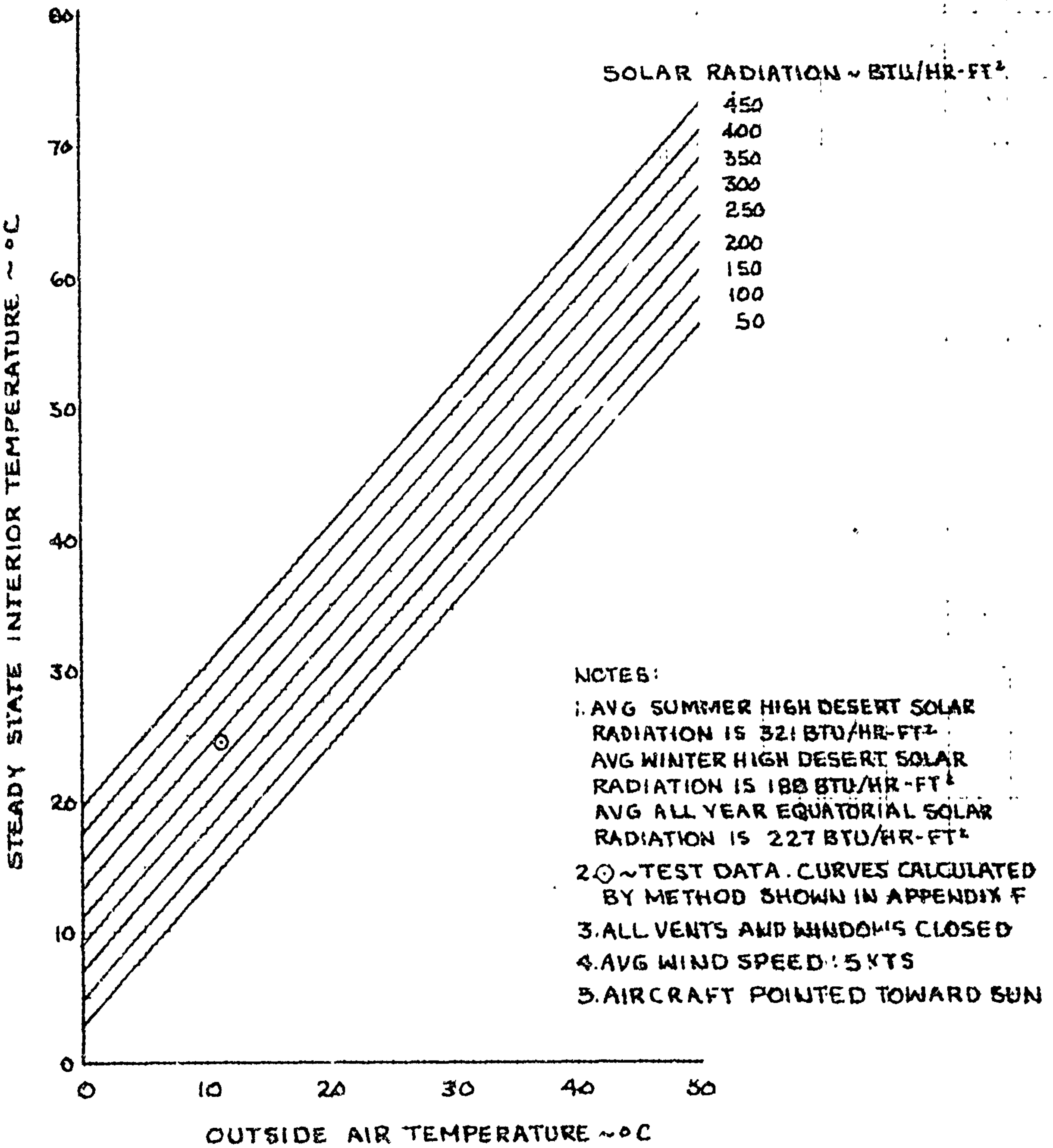


FIGURE 262
STATIC INTERIOR TEMPERATURE
AH-1G USA S/N 67-15844
HANGER BEARING NUMBER 5



APPENDIX F. GLOSSARY

ABBREVIATION	DEFINITION
Config	Configuration
Comb	Combined
ECS	Environmental control system
FFAR	Folding fin aerial rocket
Fwd	Forward
GW	Gross weight
H	Longitudinal axis
HR	High-rate firing, 4000 rd/min
Hz	Hertz
IGE	In ground effect
In	Inch
KCAS	Knots calibrated airspeed
L	Lateral axis
Lb	Pound
Ldg	Landing
LF	Level flight
LR	Low-rate firing, 2000 rd/min
Lt	Left
N_1	Engine gas producer turbine
N_2	Engine power turbine
OGE	Out of ground effect
Rt	Right
R/C	Rate of climb
R/D	Rate of descent
Rd/min	Rounds per minute
SHP	Shaft horsepower
TO	Takeoff
V	Vertical axis
V_{NE}	Never-exceed airspeed
V_H	Maximum airspeed for level flight
V_{loiter}	Airspeed for maximum endurance
$V_{best\ R/C}$	Airspeed for maximum rate of climb
$V_{cruise\ R/C}$	Airspeed for cruise rate of climb
$V_{min\ R/D}$	Airspeed for cruise rate of descent
30° right	30-degree right bank
30° left	30-degree left bank
60° right	60-degree right bank
60° left	60-degree left bank
90° right	Turret rotated 90° right
90° left	Turret rotated 90° left